PUBLIC NOTICE

US Army Corps
of Engineers
New York District
Jacob K. Javits Federal Building
New York, N.Y. 10278-0090
ATTN: Regulatory Branch

In replying refer to:
Public Notice Number: NAN-2016-00968-EHA
Issue Date: September 22, 2017
Expiration Date: October 23, 2017

To Whom It May Concern:

The New York District, Corps of Engineers has received a mitigation bank prospectus to establish the Evergreen Whale Creek Wetland Mitigation Bank. This notice is to inform interested parties of the proposed activities and solicit comments.

AUTHORITY: Issuance of a public notice regarding a proposed mitigation bank prospectus is required pursuant to the "Compensatory Mitigation for Losses of Aquatic Resources; Final Rule," (Rule) as published in April 10, 2008, Federal Register, Vol. 73, No. 70, Pages 19594-19705 (33 Code of Federal Regulations, Parts 325 and 332). The authorization of the proposed wetland mitigation bank may be reviewed under a separate future permit action pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 U.S. C. 403) and Section 404 of the Clean Water Act (33 U.S.C. 1344).

APPLICANT: Evergreen Environmental, LLC
Attn: Mark Renna
425 Darby Paoli Road
Wayne, Pennsylvania 19087

ACTIVITY: The prospective mitigation bank sponsor, Evergreen Environmental, LLC, has requested Department of the Army authorization to provide compensatory mitigation to establish and maintain an 18.68 acre area that would consist of brackish emergent marsh, open water, mudflat habitat and upland habitat.

All aspects associated with the objectives, establishment, operation, monitoring/maintenance, and long term management of the proposed bank is discussed in the "Evergreen Whale Creek Mitigation Bank Prospectus" dated August 2017. To view the Prospectus please visit the Public Notices section of the New York District's Regulatory Branch page online at: www.nan.usace.army.mil/PublicNotices and select the public notice labeled NAN-2016-00968-EHA.

The proposed mitigation bank may be one of a number of practicable options available to applicants to compensate for unavoidable impacts to aquatic resources associated with Department of the Army permits issued under Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403) and Section 404 of the Clean Water Act (33 U.S.C. 1344).

The mitigation bank prospectus will be reviewed by the New York District of the U.S. Army Corps of Engineers in consultation with a group of federal and state agency representatives known as the Interagency Review Team (IRT). The New York District of the U.S. Army Corps of Engineers is the chair of the IRT. The New Jersey Department of Environmental Protection is the co-chair of the IRT.

WATERWAY: Whale Creek (Raritan Bay-Lower Bay Watershed)

LOCATION: Town of Old Bridge, Middlesex County, New Jersey

FEDERAL EVALUATION OF THE PROPOSAL: The Corps of Engineers is soliciting comments from the public; federal, state, and local agencies and officials; Indian Tribes; and other interested parties in order to consider and evaluate this proposed mitigation bank. The New York District Corps of Engineers in evaluating this proposal will consider any comments received. Comments will be used to assess the potential for the proposed mitigation bank to provide appropriate compensatory mitigation for activities authorized by Department of the Army permits.

ALL COMMENTS REGARDING THE PROSPECTUS MUST BE PREPARED IN WRITING AND MAILED TO REACH THIS OFFICE BEFORE THE EXPIRATION DATE OF THIS NOTICE, otherwise, it will be presumed that there are no objections to the activity.

Comments provided will become part of the public record for the proposed mitigation bank. All written comments, including contact information, will be made a part of the administrative record, available to the public under the Freedom of Information Act. The Administrative Record, or portions thereof, may also be posted on a Corps of Engineers internet web site. Due to resource limitations, this office will normally not acknowledge the receipt of comments or respond to individual letters of comment.

It is requested that you communicate the foregoing information concerning the activity to any persons known by you to be interested and who did not receive a copy of this notice. If you have any questions concerning this application, you may contact this office at (917) 790-8523 and ask for Naomi Handell.

In order for us to better serve you, please complete our Customer Service Survey located at http://www.nan.usace.army.mil/Missions/Regulatory/CustomerSurvey.aspx.

For more information on New York District Corps of Engineers programs, visit our website at http://www.nan.usace.army.mil.

For and In behalf of

Stephan A. Ryba
Chief, Regulatory Branch

Evergreen Whale Creek Mitigation Bank Prospectus

Submitted to:

U.S. Army Corps of Engineers, New York District
26 Federal Plaza
New York, New York

Submitted by:

Evergreen Environmental, LLC
425 Darby Paoli Road
Wayne, PA 19087

Prepared by:

HDR Engineering, Inc.
1 International Blvd, 10th Floor Suite 1000
Mahwah, NJ 07495

August 2017

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1.0 Introduction

Evergreen Environmental ("Evergreen") proposes to develop a mitigation bank on Whale Creek in the Town of Old Bridge, Middlesex County, New Jersey (Attachment A, Figure 1). The proposed Evergreen Whale Creek Mitigation Bank site ("bank site") consists of open water, wetland and upland habitats (Photographs 1 through 4). The habitat value of the site is diminished by the colonization of the invasive common reed *Phragmites australis* ("Phragmites"), which covers the wetland portions of the site in monotypic stands (Photographs 3 and 4). The northern upland edge of the marsh is bordered by forest and residential development. The western upland edge of the bank site is the New Jersey Route 35 right of way. The habitat value of the proposed bank site could be improved with the establishment if native vegetation and increased tidal flow.

1.1 Project Location

The proposed bank site is a portion of a 18.68 acre parcel (Block 1050, Lot 1.11) flanked by parking lot and commercial development to the south, Route 35 to the west, forest to the north and tidal marsh to the east (Attachment A, Figure 2). The proposed restoration area is 7.4 acres of degraded tidal wetlands.

1.2 Project Background

A preliminary assessment of the Whale Creek site was conducted in the summer of 2016 with the objective of evaluating the site's potential to serve as a viable mitigation bank site. The site consists of Phragmites-dominated tidal wetlands associated with Whale Creek and the Raritan Bay, and upland habitats.

The proposed mitigation bank site is located in the lower Raritan Bay drainage, a region long recognized as a valuable resource within the New York/New Jersey Harbor, Hudson Raritan Estuary area. Restoration of the site would be consistent with:

1. The Hudson-Raritan Estuary (HRE) Comprehensive Restoration Plan – The USACE and the Port Authority of New York and New Jersey are developing a comprehensive plan to restore the degraded habitat within the HRE. The 2007 Target Ecosystem Characteristics for the Hudson Raritan Estuary report developed by Cornell University and the Hudson River Foundation set the goal and objectives for the HRE Study. One of the Target Ecosystem Characteristics for the plan is the restoration and / or creation of Coastal Wetlands within the HRE by 2050.

2. The Sustainable Raritan River Initiative – a joint program of Rutgers' Edward J. Bloustein School of Planning and Public Policy and the School of Environmental and Biological Science, works with various stakeholders around the Raritan Basin and Bay to balance social, economic and environmental objectives towards the common goal of restoring the Raritan River, its tributaries and its estuary for current and future generations.

3. The Lower Raritan Watershed Partnership - the Lower Raritan Watershed Partnership's (LRWP) goal is to restore, enhance, and conserve, the natural resources of "New Jersey Watershed Management Area 9 (WMA 09; the Lower Raritan Watershed) through science-based stewardship, education and innovation. While the bank site does not fall within WMA 09, the service area would include WMA 09 (Attachment A, Figure 3).

The establishment of a mitigation bank in this region is not only consistent with existing restoration initiatives, but will help to improve the overall value of the region's habitat by contributing to a large expanse of connected fish and wildlife habitat. The following sections describe the existing conditions of the proposed bank site.

Evergreen met onsite with the Interagency Review Team (IRT) on September 29, 2016. The IRT provided advice, direction and offered comments. The IRT submitted written comments on a draft Prospectus in a letter dated April 20, 2017.

Advice included direction to develop a contamination sampling plan for agency review and approval. A plan was originally submitted to the IRT on November 10, 2016. The New Jersey Department of Environmental Protection's (NJDEP) Bureau of Environmental Evaluation and Risk Assessment (BEERA) and United States Fish and Wildlife Service (USFWS) provided comments and recommended sampling analysis. The sampling plan was revised and re-submitted to the IRT on December 23, 2016. Further detail on this contamination sampling can be found in Section 3.4.7.

1.3 Regulatory Framework

The mitigation bank is proposed in accordance with the Federal Rules; "Compensatory Mitigation for Losses of Aquatic Resources"; Final Rule (33 CFR Parts 325 and 332 and 40 CFR Part 230) of April 10, 2008. This mitigation bank will provide mitigation for impacts to aquatic resources including impacts to wetlands.

The mitigation bank will be developed in accordance with the following state authorities and implemented to provide aquatic resource mitigation including mitigation for regulated impacts to waters of the U.S., and wetlands as regulated by the state.

- New Jersey Waterfront Development Law (N.J.S.A. 12:5-1 et seq.)
- New Jersey Freshwater Wetlands Protection Act of 1987 (N.J.S.A. 13-9B-1 et seq.)
- Rules on Coastal Zone Management (N.J.A.C. 7:7 et seq.)

Federal rules for a complete Prospectus detail requirements as follows:

(2) Prospectus

A complete prospectus includes the following information:

(i) The objectives of the proposed mitigation bank or in-lieu fee program.

(ii) How the mitigation bank or in-lieu fee program will be established and operated.

(iii) The proposed service area.

(iv) The general need for and technical feasibility of the proposed mitigation bank or in-lieu fee program.

(v) The proposed ownership arrangements and long-term management strategy for the mitigation bank or in-lieu fee project sites.

(vi) The qualifications of the sponsor to successfully complete the type(s) of mitigation project(s) proposed, including information describing any past such activities by the sponsor.

(vii) For a proposed mitigation bank, the prospectus must also address:

(A) The ecological suitability of the site to achieve the objectives of the proposed mitigation bank, including the physical, chemical, and biological characteristics of the bank site and how that site will support the planned types of aquatic resources and functions;

2.0 Prospectus

Pursuant to the federal rules, this section provides the information necessary for a Prospectus and associated public notice. Details of the proposed mitigation plan are provided in Section 3.0 - Mitigation Plan.

(i) Objectives of the proposed mitigation bank

The applicant and Bank Sponsor, Evergreen, has requested Department of the Army approval of the Prospectus to establish a mitigation bank. The Bank would establish and maintain 18.68 acres of wetland and upland habitat and provide wetland and aquatic resource mitigation for permitted projects within the region as defined by the service area. The area currently consists of tidally restricted and filled marsh dominated by Phragmites.

(ii) How the mitigation bank will be established and operated

The Sponsor will establish, operate, and maintain the restored tidal wetland, open water and upland habitat in accordance with the provisions of a Mitigation Banking Instrument (MBI), as well as a Corps' Nationwide Permit 27 and applicable state permits.

The acres of wetland habitat implemented by the establishment of the Bank will be categorized as enhancement. A ratio of acres of habitat by wetland category to mitigation credits generation will be a 3:1 ratio for enhancement.

It is proposed that the credits will be available to be used as mitigation in accordance with applicable requirements. One (1) credit from the Bank would mitigate for one (1) typical acre of authorized wetland impact. At present, Evergreen anticipates the following mitigation acres and credits on-site as a result of this mitigation plan.

Table 1: Wetland Mitigation Acres and Credits for theEvergreen Whale Creek Mitigation Bank

Mitigation Category	Ratio		Acres	Credits
Estuarine Wetland Enhancement	3	:1	7.43	2.48
Estuarine Tidal Wetland Preservation	27	:1	8.40	0.31
Palustrine Wetland and Upland Preservation	27	:1	2.85	0.11
Mitigation Bank Total			18.68	2.90

Permitted projects proposed for utilization of credits will be submitted to the Corps and/or NJDEP for consideration in conjunction with the permitting for such projects. The Sponsor will submit a statement to the Interagency Review Team (IRT) each time credits are debited or additional credits are approved.

Upon submittal of all appropriate documentation by the Sponsor and subsequent approval by the IRT, it is agreed that credits will become available for use by the Sponsor for sale to approved permittees in accordance with the credit totals presented in Table 1. Table 2 presents acres of existing habitat on site.

Table 2: Existing Vegetative Community Acreages

Habitat Type	**Acreage**
Upland/Forested	2.85
Phragmites Wetland	7.43
Spartina Wetland	7.44
Open Water	0.96
Total	**18.68**

(iii) The proposed service area

The proposed Service Area is depicted on Attachment A, Figure 3. Located in HUC-11 020-30-104-060 Raritan/Sandy Hook Bay Tributaries, the bank site is within the HUC-8 020-30-104 of the Raritan Bay drainage. The service area includes HUC-11 hydrologic unit code watershed numbers as follows:

020-30-104-010
020-30-104-020
020-30-104-030
020-30-104-050
020-30-104-060 (Bank Location)
020-30-104-070
020-30-104-080
020-30-104-090
020-30-104-100

020-30-104-910
020-30-104-920
020-30-104-930
020-30-105-120
020-30-105-160

In the service area, the mitigation credits from the bank will be used to mitigate for impacts to estuarine and palustrine emergent, mudflat, scrub/shrub and open water wetlands and waters of the U.S. Only the mitigation credits from the forest preservation derived from upland preservation acreage will be used to mitigate for impacts to palustrine forested wetlands.

(iv) The general need for and technical feasibility of the proposed mitigation bank

There is a general need for wetland mitigation in the Raritan Bay region. Limited mitigation is available for permitted projects in the region as there are no mitigation banks. The proposed wetland mitigation bank is technically feasible and incorporates design concepts applied successfully to other mitigation sites in the state over the past several decades. The concept entails the lowering of site elevations, some filled as a result of man-made activities. The earthwork and hydrologic impediment removal will restore tidal flow and exchange. Non-native invasive species currently dominating the site, including Phragmites, will be treated with herbicides and native plantings will be introduced to restore the wetland habitat.

The concept described above has been implemented on many tidal restoration sites in the state and is proven to be technically feasible. The most relevant examples are the Evergreen MRI3 Mitigation Bank, Port Reading Mitigation Bank, Stipson's Island Mitigation Bank, all approved, built and planted and have met success criteria for credit release.

(v) The proposed ownership arrangements and long-term management strategy for the mitigation bank site

The mitigation bank property is under option to be owned by Evergreen. The mitigation bank would be monitored and maintained by the Sponsor through a monitoring period until performance metrics are achieved. The entire Bank area would be protected in perpetuity under a Conservation Deed Restriction/Easement.

Upon completion of the monitoring period, the Sponsor will monitor and maintain the Bank until all credits are sold or for 10 years which is later. Subsequently, the bank ownership will be transferred to a land steward that is either a government agency or land conservancy and protected under the Conservation Deed Restriction.

(vi) The qualifications of the sponsor

The Sponsor has implemented mitigation banks and mitigation sites in the state for several years. These projects have been approved by the regulatory agencies and have passed monitoring and maintenance periods successfully. The Sponsor has developed wetland mitigations bank in the Hackensack Meadowlands, Cape May, Cumberland, Gloucester and Hunterdon Counties. The Evergreen MRI3 Mitigation Bank, which is a tidal wetland mitigation bank, is a state and federally approved bank as per the U.S. Army Corps of Engineers, New

York District. The Sponsor is qualified to implement a mitigation bank. Resumes will be supplied upon request.

(A) The ecological suitability of the site to achieve the objectives of the proposed mitigation bank, including the physical, chemical, and biological characteristics of the bank site and how that site will support the planned types of aquatic resources and functions

The site is predominantly a Phragmites-dominated, tidally-restricted wetland due to marsh accretion and fill, some from side cast related to ditch excavation and creek realignment. With the exception of one elevated lead sample near Route 35, the sediments of the site display only slightly elevated levels of contaminants. The area of lead contamination will be delineated and removed and disposed of at an appropriate disposal facility. Removal of the sediments during regrading will remove contaminant loadings from the watershed and provide for tidal exchange. The tidal exchange is critical to the establishment of a native vegetative community of higher habitat value than the monoculture of Phragmites.

Once implemented, the bank will be a combination of brackish emergent marsh, open water, and mudflat habitat, generally inundated twice a day during the tidal cycle with areas of higher elevation marsh to increase habitat diversity and reduce re-contamination. The marsh plain will be vegetated with native species and invasive species will be controlled via herbicide treatment and excavation as well as planting of native species to out-compete the invasive species. The tidal inundation of the site will also serve to curtail invasive species through increased hydroperiod and increased salinity levels.

The upland and forest habitat at the edge of the site will be preserved.

The re-establishment and restoration of the tidal hydrologic regime is the key step to supporting the proposed and planned types of aquatic resources. The aquatic resources planned and proposed provide functions typical of restored tidal marshes of the region. Functions anticipated to be restored at the bank site include flood storage, nutrient retention as well as transport and water filtration and, therefore, improved water quality will result from the interaction of the daily tides with the marsh plain vegetated with native species. Wildlife and fish habitat including habitat for threatened and endangered species will be restored in the aquatic community as well as in the upland habitat community. Social functional benefits will include increased opportunities for scientific education, passive recreation and aesthetic visual benefits of a restored tidal marsh interspersed with upland habitat.

See **Attachment B - Functional Value Assessment** for a complete analysis of existing and proposed functions, values and services.

Details regarding the mitigation bank's existing conditions, design, mitigation benefits, functions and services provided are presented in the following section, Section 3.0 - Mitigation Plan.

3.0 Mitigation Plan

3.1 (1) Objectives: A description of the resource type(s) and amount(s) that will be provided, the method of compensation (i.e., restoration, establishment, enhancement, and/or preservation).

The acres of wetland and upland habitat implemented by the establishment of the Bank will be categorized as enhancement and preservation. A ratio of acres of habitat by wetland category to mitigation credits generation will be a 3:1 ratio for enhancement and 27:1 ratio for preservation (Figure 4).

It is proposed that the credits will be available to be used as mitigation in accordance with applicable requirements. One (1) credit from the Bank would mitigate for one (1) typical acre of authorized wetland impact. At present, Evergreen anticipates the mitigation acres and credits on-site as a result of this mitigation plan as tabulated in Table 1, above.

Permitted projects proposed for utilization of credits will be submitted to the Corps and/or NJDEP for consideration in conjunction with the permitting for such projects. The Sponsor will submit a statement to the IRT each time credits are debited or additional credits are approved. Upon submittal of all appropriate documentation by the Sponsor and subsequent approval by the IRT, it is agreed that credits will become available for use by the Sponsor for sale to approved permittees in accordance with the credit totals presented in Table 1.

3.2 (2) Site selection. A description of the factors considered during the site selection process.

The bank site was selected in the Raritan Bay/Atlantic region based on previous land use and degradation of wetlands and proximity to other native wetland sites. The site is restricted from the tides and partially filled and vegetated with invasive species. The site is a tidally restricted, human-altered and partially filled wetland ideally suited for classic marsh restoration implementation through removal of fill material resulting in marsh restoration and reconnection. The proposed mitigation site is also adjacent to several parcels of public land, Green Acres parcels and preserved open space. (Attachment A, Figure 5)

3.3 (3) Site protection instrument. A description of the legal arrangements and instrument, including site ownership.

The bank site will be protected under a conservation deed restriction as employed by NJDEP and USACE.

3.4 (4) Baseline information. A description of the ecological characteristics of the proposed compensatory mitigation project site.

3.4.1 Existing Conditions/Site Survey

As stated above, the proposed mitigation bank site is on an 18.68 acre portion of Block 1050, Lot 1.11 in the Town of Old Bridge, New Jersey. The site consists of predominantly wetland

and open water habitats with upland areas along the northern and western portions of the site. The bank site habitats are shown on the map presented in Attachment A, Figure 6.

3.4.2 Topography

Topographic elevations at the bank site range from below 1.0 feet NAVD88 to 3.5 feet. In general, creek and ditch banks are at 1.1 feet with most of the marsh, both Phragmites and *Spartina sp.* ranging between 1.5 to 2.4 feet. Forest edge generally begins at 2.4 feet and slopes up and the Route 35 right-of-way interface is at elevation 3.0 feet and slopes up.

Review of the topography mapping and historical aerials indicates elevations have been modified by human disturbance. Most notably, Whale Creek has been realigned and ditched. The excavated material was likely side-cast creating areas of higher elevation adjacent to the watercourses on site.

A biobenchmarking survey established an elevation range for *Spartina alterniflora* generally occurring between 1.47 and 2.60 feet, but occurring as high as 2.9 feet and as low as 0.5 feet (NAVD88). *Phragmites australis* generally occupies a range slightly higher from 1.98 feet to 2.64 feet and above, but also occurring as low as 1.79 feet (NAVD88).

3.4.3 Hydrology

Located within the Atlantic Coast Water region and Raritan Bay watershed, the proposed bank site is within the New Jersey Department of Environmental Protection's (NJDEP's) Watershed Management Area 12 (WMA-12) for Monmouth County.

The proposed bank site is within hydrologic unit code HUC 020-30-104; specifically HUC-11 020-30-104-060. The entire site is within the 100-year floodplain of Whale Creek and Raritan Bay, with the majority being within Zone VE (100 year flood zone with wave velocity hazard; Attachment A, Figure 7). Tidal amplitude at the site appears to be approximately 4-5 feet based on field observation and tide station data from the region (Table 3).

3.4.4 Tidal Datums

The Whale Creek bank site is subject to mixed semi-diurnal tides, typical to the region that flood portions of the wetland with brackish water via unnamed tributaries to Whale Creek. Whale Creek discharges into the Raritan Bay just north of the bank site (Attachment A, Figure 1). As part of the design process for the Whale Creek Mitigation Bank, tide gages were installed at the site in November 2016. Two gages were placed within Whale Creek near the northern and southern ends of the Whale Creek bank site and were monitored though January 2017 for a total duration of three months. Another two gages were placed upstream to measure the extent of inundation in upstream isolated pools. The tide gage data from the bank site (subordinate stations) and existing local tide data published by the National Oceanic and Atmosphere Administration (NOAA) at Sandy Hook, NJ (primary station) was used to determine the local tidal datum (mean high and mean higher high tide, and mean low and mean lower tide) elevations at the Whale Creek bank site. The local tidal datums will be used in the final restoration design.

Site design will be based on the results of the bio-benchmarking survey completed on the Whale Creek Bank site in October of 2016 (described under section 3.4.5), tide gage data collected on site, and NOAA's Vertical Transformation Datum Software ("VDatum"). VDatum is a coordinate system conversion software tool jointly developed by NOAA's National Geodetic Survey (NGS), Office of Coast Survey (OCS), and Center for Operational Oceanographic Products and Services (CO-OPS). It allows users to convert their geospatial data into a variety of different horizontal and vertical coordinate systems, including tidal datum transformations and can provide a modeled estimate of tidal datum elevations within its model domain. Table 3 lists the tidal data reported by VDatum at each station. Information from these three investigations provide independent "cross checks" to verify the extents of tidal range and, in principle, should yield similar results.

Assessment of hydrology at Whale Creek indicates that the areas where elevations exceed 2.6 ft (NAVD88) are inundated on an irregular basis based on the portions of the site where grade elevation is at or above Mean High Water (MHW). Some wetland elevations in areas that are dominated by Phragmites exceed MHW and do not receive regular daily tidal flow. Phragmites likely causes the site's irregular hydrology as it accretes soils that raise the marsh's elevation and impede free flow of water across and through the site.

3.4.4.1 Tidal Datum Analysis

Computation of tidal datums was conducted using the observed tidal data collected at two loggers installed in November 2016 on Whale Creek within and adjacent to the Whale Creek Bank Site to determine mean high water, mean higher high water (MHHW), mean low water (MLW) and mean lower low water (MLLW) (Figure 8). Data were collected from November 1, 2016 through April 29, 2017 for this analysis. Tidal datums were computed using the Modified Range-Ratio Method described in NOAA's *Computational Techniques for Tidal Datums Handbook* (NOAA 2003). The tidal datums were referenced to the 1983-2001 National Tidal Datum Epoch using Sandy Hook, NJ (NOAA Station 8531680), located approximately 11 miles east of the Whale Creek site, as the primary control station. Results of the tidal datum analysis are presented in Table 3 below. Total inundation time in terms of percentage is presented in Table 4 and Exhibit 1.The calculated MHW and MHHW for the Downstream and Middle data loggers only slightly differ from those predicted by VDatum. Calculated MLWs and MLLWs from the data loggers deployed onsite yielded a higher disparity from those predicted from Vdatum (approximately 1.4 ft higher). This is likely due to the morphology of Whale Creek and downstream impediments that have limited the ebbing tide as it moves out to Raritan Bay. Near the confluence of Whale Creek with Raritan Bay a large sand bar shoal exists that is likely acting as an obstruction to water exiting the creek during low tide. Additionally, based on historical aerial imagery, Whale Creek was ditched to the north and west in the 1930s. This could also have an influence on the drainage and hydrology of the creek.

Sandbars are naturally occurring formations that are constantly changing based on the hydrodynamics, landscape morphology and storm events in Raritan Bay. The sandbar at the mouth of Whale Creek is roughly one mile away from the project area and will continue to transform regardless if this site is constructed.

Restoration of the site is not anticipated to substantially affect the sandbar located at the mouth of Whale Creek nor is it likely to impact any adjacent properties either upstream or downstream of the site. During the restoration, portions of the enhancement area may be regraded to a lower elevation which would increase the flood storage capacity within those enhancement areas. However, the surface area of the marsh will not substantially change. Because the sandbar acts as a downstream obstruction, it limits the amount of water that can flood and drain from Whale Creek during a tidal cycle. The volume of water and, more specifically, the velocity at which that water drains out of Whale Creek are not expected to substantially change. Therefore, the sandbar is not expected to change as a result of this project. The restoration of tidal hydrology to a portion of the bank site will not affect and alter lands not under the control of the Sponsor.

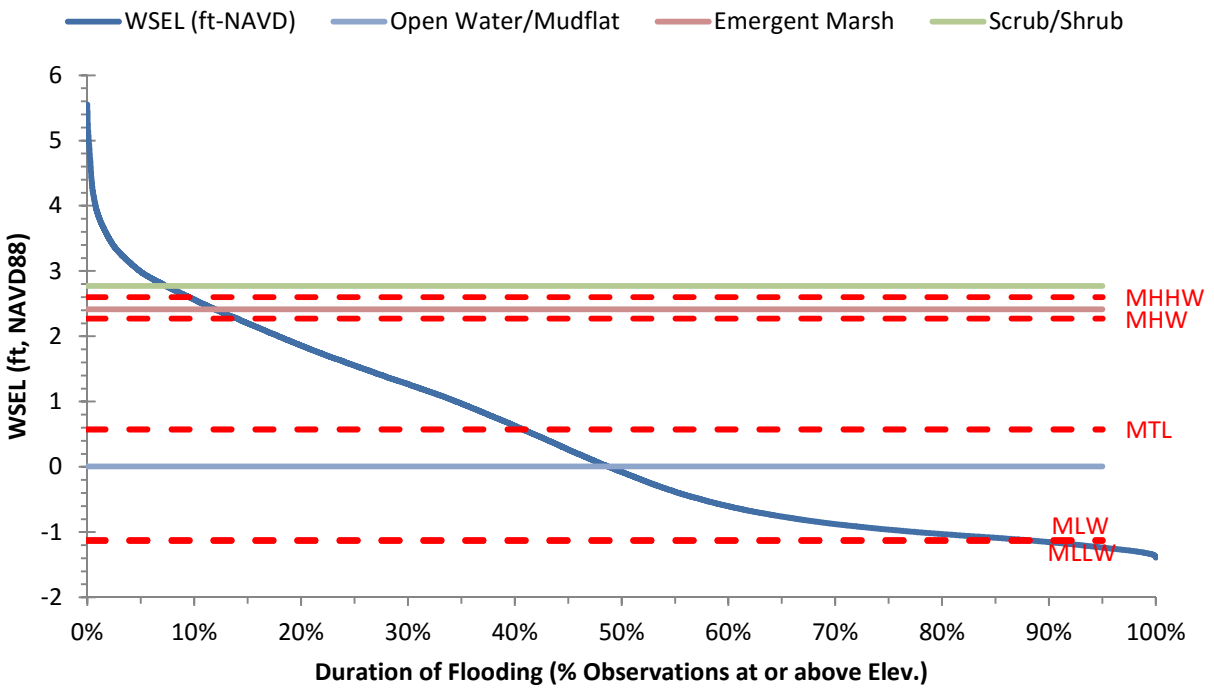
Table 3: Tidal Elevations as predicted by VDatum and calculated by the tidal data loggers deployed at the Whale Creek Mitigation Bank Site

Datum	Tidal Elevation (ft. NAVD88)		
	Whale Creek NOAA Vdatum	Whale Creek Calculated Tidal Datums ("Downstream Logger")	Whale Creek Calculated Tidal Datums ("Middle Logger")
MHHW	2.67	2.60	2.59
MHW	2.33	2.27	2.26
MTL	-0.16	0.58	0.54
MLW	-2.66	-1.12	-1.17
MLLW	-2.87	-1.13	-1.18

Table 4: Observed Inundation Time by Elevation (NAVD88 ft)

Elevation (ft, NAVD88)	Inundation Percentage
1.0	35%
1.5	26%
2.0	18%
2.27 (MHW)	14%
2.5	11%
2.6 (MHHW)	10%

Exhibit 1: Duration of Flooding by Elevation (NAVD88, ft) and by Tidal Datum Observed at "Middle Logger"



3.4.5 Wetlands and Vegetation Communities

The NJDEP classifies wetlands on the site as saline marshes (Attachment A, Figure 9). The National Wetlands Inventory (NWI) classifies them site as estuarine and marine wetlands (Figure 10). These wetlands are classified as estuarine, intertidal, emergent, persistent, irregularly flooded, partially drained/ditched, and oligohaline (E2EM1Pd6) based on the Cowardin System (Cowardin et al. 1979;).

A total of 14.87 acres of wetlands on site were delineated in July of 2016 by HDR Staff. Based on field observations, the vegetated wetland communities consist of dense monotypic stands of Phragmites on the outer perimeter of the site closer to the upland (7.43 acres; Photograph 3) and emergent marsh with *Spartina alterniflora, S. patens,* and *Distichlis spicata* (7.44 acres; Photographs 1, 2 and 3; Attachment A, Figure 6). Small mudflats and open water habitats are also on the site. Based on aerial photographs and wetland maps of the site, it appears that the wetlands were ditched in the past, possibly for mosquito control and creek realignment.

3.4.5.1 Bio-Benchmark Survey

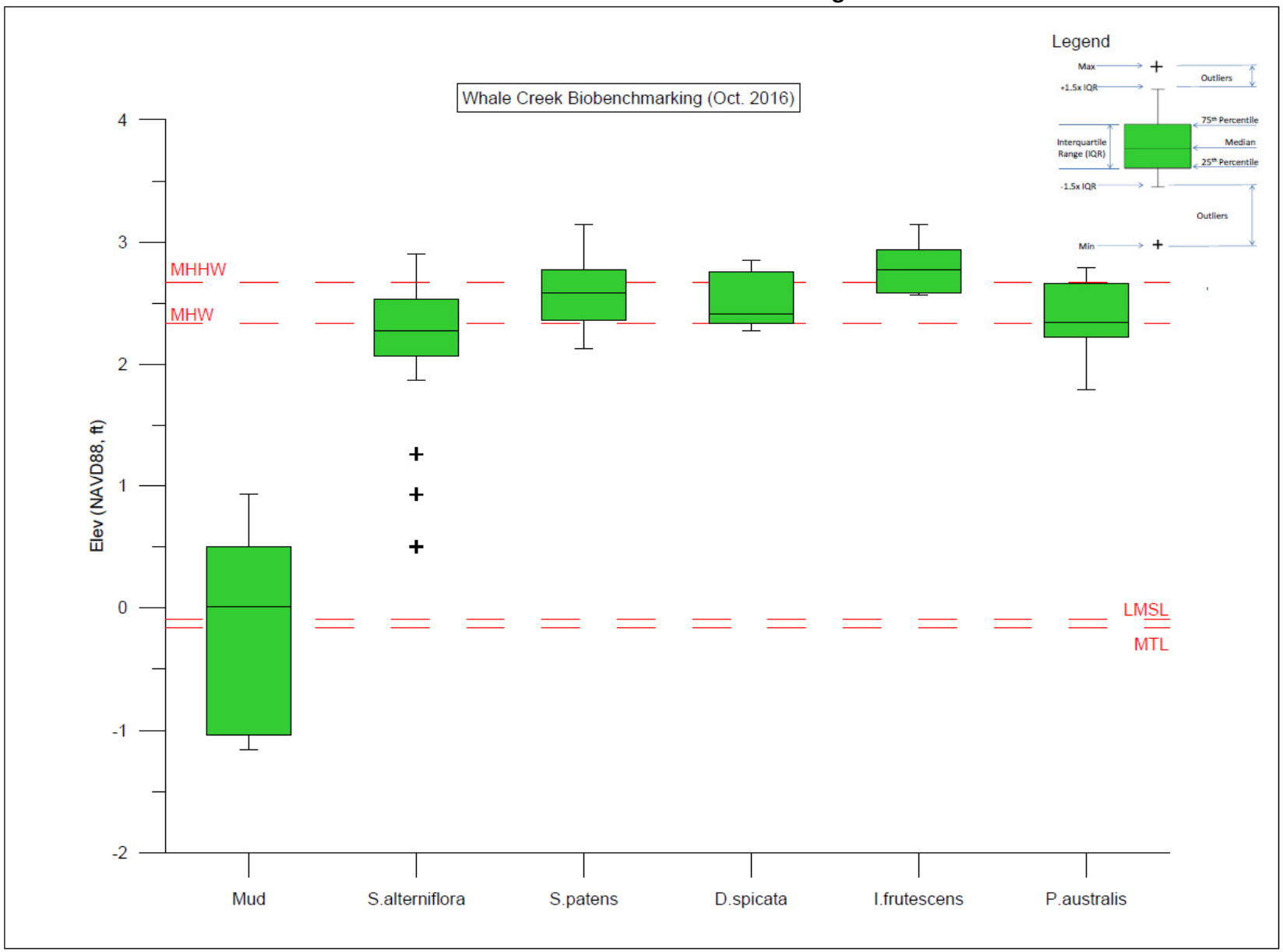
Bio-benchmarking data was collected on October 25, 2016 from the Whale Creek Site to understand the relationship between the vegetation community and tidal regime on the bank site. To evaluate local tide condition, four informal transects were run perpendicular to the shoreline at these sites. Indicators such as mudflat/open water and specific vegetation communities were selected and their elevation range was documented (when present) using a high-accuracy Trimble Real Time Kinematic GPS. Based on this bio-benchmarking data, the observed elevation ranges for the open water/mudflat, emergent marsh and shrub/scrub communities are identified in Table 5.

Table 5: Bio-benchmark Elevations Collected at Whale Creek

Community	Characteristic Species	Tidal Elevation (NAVD88 feet)	
		Category	Whale Creek Marsh
Open Water/Mudflat	NA	Average Low Elevation	-0.71
		Lowest Elevation	-1.16
		Average High Elevation	-0.32
		Highest elevation	0.93
Emergent Marsh	*Spartina alterniflora*	Average Low Elevation	1.47
		Lowest Elevation	0.50
		Average High Elevation	2.60
		Highest elevation	2.90
	S. patens	Average Low Elevation	2.26
		Lowest Elevation	2.13
		Average High Elevation	2.88
		Highest elevation	3.14
	Distichlis spicata	Average Low Elevation	2.33
		Lowest Elevation	2.28
		Average High Elevation	2.70
		Highest elevation	2.85
Scrub/Shrub	*Iva frutescens*	Average Low Elevation	2.64
		Lowest Elevation	2.57
		Average High Elevation	2.83
		Highest elevation	3.14

As previously stated, the biobenchmarking survey established an elevation range for *Spartina alterniflora* generally occurring in low elevation emergent marsh between elevations of 1.47 and 2.60 feet, but occurring as high as 2.9 feet and as low as 0.5 feet (NAVD88). *Phragmites australis* generally occupies a range slightly higher from 1.98 feet to 2.64 feet, but can also occur as low as 1.79 feet and higher than 2.8 feet (NAVD88). Results by species can be seen in the graph on the next page (Exhibit 2).

Exhibit 2: Whale Creek Biobenchmarking Results



3.4.6 Soils

Soils on the proposed bank site are mapped by the Natural Resources Conservation Service (NRCS) as frequently flooded Manahawkin muck (MakAt) with 0 to 2 percent slopes. Soils on the upland portion along the northern edge of the site is classified as Keyport loam (KeoD) with 10 to 15 percent slopes. A small portion of upland in the southwestern corner of the site is classified as Udorthents with 0 to 8% slopes. Residential areas to the north of the proposed bank site are mapped as urban land, Keyport sandy loam (KemB), 2 to 5 percent slopes (Attachment A, Figure 11).

3.4.7 Contamination

Sediment sampling was conducted during field investigations in July (Attachment A, Figure 12) and December of 2016 (Attachment A, Figure 13). Tables 6 through 9 present results from these two rounds of sampling compared to the NJDEP Ecological Screening Criteria established for sediment in saline waters (NJDEP 2009). Tables 6 and 8 present results for metals, PCBs, pesticides, volatiles, and semi-volatiles. Tables 7 and 9 present results for dioxin and furan sampling compared to the apparent effects threshold (AET) established by the NJDEP.

Results of laboratory analyses revealed that several of the metal analytes were present in the sediments at levels above Effects Range-Low (ER-L) and Effects Range-Median (ER-M) sediment screening criteria. Of the July 2016 samples, 9 of the 14 samples had concentrations of mercury that exceeded the ER-M (Table 6). Low levels of dioxins and furans were detected during the July sampling events (Table 7). Of the December 2016 samples, 8 of the 10 samples collected had concentrations of mercury that exceed ER-M (Table 8). Elevated mercury levels were not unexpected, as the site is hydrologically connected to Raritan Bay. Two samples from the proposed bank site exceeded the AET concentration for Total 2,3,7,8 TCDD (TEQ) of 3.6 ng/kg designated by the NJDEP in their Ecological Screening Criteria. December 2016 samples yielded 9 of the 10 concentrations above the AET (Table 9).

3.4.7.1 Site-wide Statistics Summary

As requested by the NJDEP's BEERA in correspondence on December 6, 2016 site-wide statistics for the Whale Creek site were calculated for the sediment samples collected during July and December 2016 field investigations. These results are presented in tables in Attachment C.

Table C.1 presents the basic statistics for the data set, including minimum detected concentrations, maximum detected concentrations, arithmetic mean, detection frequency, range of detection limits and the 95% Upper Confidence Limits (UCLs) of the arithmetic mean for the target analytes in units of milligrams per kilogram, except for dioxins. Table C.2 provides the same statistics for dioxins, presented in nanograms per kilogram.

The 95% UCL is an upper estimate of the unknown actual population mean of contaminant concentrations on a site and takes into account the data set distribution, data set size, skewness and percentage of non-detect concentrations. Calculation of the 95% UCL was conducted for these data sets in accordance with United States Environmental Protection Agency's (USEPA) ProUCL software package, version 5.1.002 (2016) and User Guide for ProUCL (USEPA 2015a). ProUCL is a comprehensive and recognized statistical software package that computes rigorous statistical tests and graphs to aid in the evaluation of environmental data. The ProUCL software calculates 95% UCLs using parametric and non-parametric methods and then makes a recommendation on which UCL is the most accurate. In some cases, the software suggested more than one 95% UCL estimate; professional judgment was used to choose the 95% UCL estimate based on information provided in the ProUCL output. Table C.3 presents the ProUCL outputs for the calculation of the 95% UCLs for reference.

General observations from the site-wide statistics indicate the following for the contaminants of concern (lead, mercury, dioxins/furans and polychlorinated biphenyls (PCBs)):

- The lead sediment concentrations range from 76 to 3,500 mg/kg and have a 100 percent detection frequency; the maximum concentration occurred in sampling location WCSB05; these concentrations exceed the NJDEP's ER-L of 47 mg/kg and ER-M of 218 mg/kg. The 95% UCL of 388 mg/kg also exceeds the ER-L and ER-M.

- The mercury sediment concentrations range from 0.26 to 2.6 mg/kg and have a detection frequency of 83 percent; the maximum concentration occurred in sampling location WCSB07. The 95% UCL of 1.48 mg/kg exceed the ER-L of 0.15 mg/kg and ER-M of 0.71 mg/kg.

- The 2,3,7,8 TCDD sediment concentrations range from 2.8 to 4.4 ng/kg and have a detection frequency of 31 percent; the maximum concentration occurred in sampling location WCSB08. The 95% UCL of 2.89 ng/kg does not exceed the AET of 3.6 ng/kg. None of the other dioxins have NJDEP sediment criteria for comparison.

- The PCB Aroclor™ sediment concentrations are non-detect (detection limit range of 0.06 to 0.11 mg/kg), with the exception of two detections in sample B12. PCB Aroclor™ 1254 has a concentration of 0.098 mg/kg and thus, the PCB (total) concentration is also 0.098 mg/kg in sample B12. The PCB (total) concentration exceeds the ER-L of 0.023 mg/kg, but does not exceed the ER-M of 0.18 mg/kg. The Aroclor™ 1254 concentration exceeds the NJ Freshwater Lowest Effects Level (LEL) of 0.06 mg/kg for Aroclor 1254, used as a surrogate for ER-L per the note on the NJ criteria table, but does not exceed the NJ Freshwater Severe Effects Level (SEL) of 34 mg/kg, used as a surrogate for the ER-M. In consideration of laboratory detection limits with the potential of being greater than ecological screening criteria for evaluation of PCBs, a PCB congener analysis was performed, as described further below.

Table 6: July 2016 Sediment Sampling Results

Analyte	Sample ID:		B1	B2 (D)	B3	B4 (D)	B5	B6	B7	B8 (D)	B9	B10	B11	B12	B13	B14
	LAB ID:		AC92394-001	AC92394-002	AC92394-003	AC92394-004	AC92394-005	AC92394-006	AC92394-007	AC92394-008	AC92394-009	AC92394-010	AC92394-011	AC92394-012	AC92394-013	AC92394-014
	Sample Depth (Inches below surface)		0-6	24	0-6	24	0-6	0-6	0-6	24	0-6	0-6	0-6	0-6	0-6	0-6
	ER-L (mg/kg)	ER-M (mg/kg)	Concentration (mg/Kg)													
Metals																
Aluminum	NC	18000	6,700	16,000	29,000	31,000	18,000	44,000	17,000	45,000	20,000	36,000	26,000	22,000	20,000	13,000
Antimony	NC	9.3	<1.1	<3.5	<6.7	7.7	<6.2	<3.6	<4.7	<3.5	<3.3	<2.6	<1.9	<1.9	<5	<4
Arsenic	8.2	70	15	33	20	89	110	81	37	1.1	57	13	43	39	39	28
Barium	NC	48	21	<43	<83	72	<77	82	<59	67	<42	89	64	59	<62	<50
Beryllium	NC	NC	<0.28	1.3	2.7	2.5	5.8	4.5	3.1	1.7	2.5	0.98	1.7	1.7	2.7	<1
Cadmium	1.2	9.6	<0.56	<1.7	<3.3	<2.5	<3.1	<1.8	<2.4	<1.7	<1.7	<1.3	<0.95	<0.95	<2.5	<2
Calcium	NC	NC	<1400	<4300	<8300	<6200	8,900	6300	<5900	5500	7,200	14000	2800	3000	<6200	6600
Chromium	81	370	54	180	140	1400	52	410	64	230	68	290	210	99	80	54
Cobalt	NC	10	<3.5	12	54	21	49	110	56	36	18	24	16	14	130	19
Copper	34	270	62	93	110	200	86	150	79	200	83	170	130	110	110	78
Iron	NC	NC	37,000	41,000	61,000	110,000	43,000	100,000	28,000	73,000	44,000	65,000	64,000	55,000	48,000	47,000
Lead	47	218	320	150	110	210	76	180	85	430	110	230	160	160	110	96
Magnesium	NC	NC	2,200	5,700	12,000	13,000	14,000	12,000	9,300	10,000	10,000	13,000	9,200	9,300	11,000	13,000
Manganese	NC	260	120	99	1200	620	5,800	5400	680	260	410	350	390	520	970	1000
Mercury	0.15	0.71	0.26	0.62	0.75	1.7	<0.64	1.2	<0.49	1.4	1.2	1.9	1.6	2	0.67	0.81
Nickel	21	52	9	32	68	56	59	110	69	80	38	62	38	33	130	38
Potassium	NC	NC	860	<2200	4300	4,300	5,600	4,100	3200	3800	4,000	5,700	4,100	4,100	3,600	4,900
Selenium	NC	1	<2.8	9.9	<17	19	26	17	<12	9.4	11	<6.5	7.9	7.1	<13	<10
Silver	1	3.7	0.31	<0.87	<1.7	<1.2	4.4	0.98	<1.2	<0.87	1.1	<0.65	1.3	1.6	<1.2	<1
Sodium	NC	NC	2,000	25,000	55,000	50,000	67,000	36,000	42,000	35,000	35,000	31,000	16,000	16,000	48,000	56,000
Thallium	NC	3.4	<0.56	<1.7	<3.3	<2.5	<3.1	<1.8	<2.4	<1.7	<1.7	<1.3	<0.95	<0.95	<2.5	<2
Vanadium	NC	57	55	53	<83	96	<77	110	66	98	67	120	89	79	66	61
Zinc	150	410	80	150	540	220	270	620	370	560	250	420	320	270	580	180
PCBs																
Aroclor (Total)	0.023	0.18		<0.11										0.098		
Aroclor-1016	0.007	NC		<0.11										<0.06		
Aroclor-1221	NC	NC		<0.11										<0.06		
Aroclor-1232	NC	NC		<0.11										<0.06		
Aroclor-1242	NC	NC		<0.11										<0.06		
Aroclor-1248	0.03	NC		<0.11										<0.06		
Aroclor-1254	0.06	NC		<0.11										0.098		

Analyte	Sample ID:		B1	B2 (D)	B3	B4 (D)	B5	B6	B7	B8 (D)	B9	B10	B11	B12	B13	B14
	LAB ID:		AC92394-001	AC92394-002	AC92394-003	AC92394-004	AC92394-005	AC92394-006	AC92394-007	AC92394-008	AC92394-009	AC92394-010	AC92394-011	AC92394-012	AC92394-013	AC92394-014
	Sample Depth (Inches below surface)		0-6	24	0-6	24	0-6	0-6	0-6	24	0-6	0-6	0-6	0-6	0-6	0-6
	ER-L (mg/kg)	ER-M (mg/kg)	Concentration (mg/Kg)													
Aroclor-1260	0.005	NC		<0.11										<0.06		
Aroclor-1262	NC	NC		<0.11										<0.06		
Aroclor-1268	NC	NC		<0.11										<0.06		
Pesticides																
a-Chlordane	NC	6		0.03										<0.012		
Aldrin	NC	NC		<0.022										<0.012		
Alpha-BHC	NC	NC		<0.0043										<0.0024		
beta-BHC	NC	NC		<0.0043										<0.0024		
delta-BHC	NC	NC		<0.022										<0.012		
Dieldrin	NC	NC		0.0077d										<0.0024		
Endosulfan I	NC	NC		<0.022										<0.012		
Endosulfan II	NC	NC		<0.022										<0.012		
Endosulfan Sulfate	NC	NC		<0.022										<0.012		
Endrin	NC	NC		<0.022										<0.012		
Endrin Aldehyde	NC	NC		<0.022										<0.012		
Endrin Ketone	NC	NC		<0.022										<0.012		
gamma-BHC	NC	NC		<0.0043										<0.0024		
Heptachlor	NC	0.0003		<0.022										<0.012		
Heptachlor Epoxide	NC	NC		<0.022										<0.012		
Methoxychlor	NC	NC		<0.022										<0.012		
p,p'-DDD	NC	0.02		0.1										<0.006		
p,p'-DDE	NC	0.027		0.065										<0.006		
p,p'-DDT	0.001	0.007		0.056										<0.006		
Toxaphene	NC	NC		<0.11										<0.06		
y-Chlordane	NC	6		<0.022										<0.012		
SemiVolatiles																
:TotalSemiVolatileTic	NC	NC		270.0J										170.0J		
1,1'-Biphenyl	NC	NC		<0.14										<0.079		
1,2,4,5-Tetrachlorobenzene	NC	NC		<0.14										<0.079		
2,3,4,6-Tetrachlorophenol	NC	NC		<0.14										<0.079		
2,4,5-Trichlorophenol	NC	0.003		<0.14										<0.079		
2,4,6-Trichlorophenol	NC	0.006		<0.14										<0.079		
2,4-Dichlorophenol	NC	0.005		<0.036										<0.02		

Analyte	Sample ID:		B1	B2 (D)	B3	B4 (D)	B5	B6	B7	B8 (D)	B9	B10	B11	B12	B13	B14
	LAB ID:		AC92394-001	AC92394-002	AC92394-003	AC92394-004	AC92394-005	AC92394-006	AC92394-007	AC92394-008	AC92394-009	AC92394-010	AC92394-011	AC92394-012	AC92394-013	AC92394-014
	Sample Depth (Inches below surface)		0-6	24	0-6	24	0-6	0-6	0-6	24	0-6	0-6	0-6	0-6	0-6	0-6
	ER-L (mg/kg)	ER-M (mg/kg)	Concentration (mg/Kg)													
2,4-Dimethylphenol	NC	NC		<0.036										<0.02		
2,4-Dinitrophenol	NC	NC		<0.72										<0.4		
2,4-Dinitrotoluene	NC	NC		<0.14										<0.079		
2,6-Dinitrotoluene	NC	NC		<0.14										<0.079		
2-Chloronaphthalene	NC	NC		<0.14										<0.079		
2-Chlorophenol	NC	0.008		<0.14										<0.079		
2-Methylnaphthalene	0.07	0.67		<0.14										<0.079		
2-Methylphenol	NC	NC		<0.036										<0.02		
2-Nitroaniline	NC	NC		<0.14										<0.079		
2-Nitrophenol	NC	NC		<0.14										<0.079		
3&4-Methylphenol	NC	NC		<0.036										<0.02		
3,3'-Dichlorobenzidine	NC	NC		<0.14										<0.079		
3-Nitroaniline	NC	NC		<0.14										<0.079		
4,6-Dinitro-2-methylphenol	NC	NC		<0.72										<0.4		
4-Bromophenyl-phenylether	NC	NC		<0.14										<0.079		
4-Chloro-3-methylphenol	NC	NC		<0.14										<0.079		
4-Chloroaniline	NC	NC		<0.036										<0.02		
4-Chlorophenyl-phenylether	NC	NC		<0.14										<0.079		
4-Nitroaniline	NC	NC		<0.14										<0.079		
4-Nitrophenol	NC	NC		<0.14										<0.079		
Acenaphthene	0.016	0.5		<0.14										<0.079		
Acenaphthylene	0.044	0.64		<0.14										<0.079		
Acetophenone	NC	NC		<0.14										<0.079		
Anthracene	0.85	1.1		<0.14										<0.079		
Atrazine	NC	NC		<0.14										<0.079		
Benzaldehyde	NC	NC		<0.14										<0.079		
Benzo[a]anthracene	0.261	1.6		0.22										<0.079		
Benzo[a]pyrene	0.43	1.6		0.27										<0.079		
Benzo[b]fluoranthene	NC	NC		0.35										<0.079		
Benzo[g,h,i]perylene	0.17	NC		0.24										<0.079		
Benzo[k]fluoranthene	0.24	NC		<0.14										<0.079		

Analyte	Sample ID:		B1	B2 (D)	B3	B4 (D)	B5	B6	B7	B8 (D)	B9	B10	B11	B12	B13	B14
	LAB ID:		AC92394-001	AC92394-002	AC92394-003	AC92394-004	AC92394-005	AC92394-006	AC92394-007	AC92394-008	AC92394-009	AC92394-010	AC92394-011	AC92394-012	AC92394-013	AC92394-014
	Sample Depth (Inches below surface)		0-6	24	0-6	24	0-6	0-6	0-6	24	0-6	0-6	0-6	0-6	0-6	0-6
	ER-L (mg/kg)	ER-M (mg/kg)	Concentration (mg/Kg)													
bis(2-Chloroethoxy)methane	NC	NC		<0.14										<0.079		
bis(2-Chloroethyl)ether	NC	NC		<0.036										<0.02		
bis(2-Chloroisopropyl)ether	NC	NC		<0.14										<0.079		
bis(2-Ethylhexyl)phthalate	0.18216	2.64651		<0.14										<0.079		
Butylbenzylphthalate	NC	0.063		<0.14										<0.079		
Caprolactam	NC	NC		<0.14										<0.079		
Carbazole	NC	NC		<0.14										<0.079		
Chrysene	0.384	2.8		0.3										<0.079		
Dibenzo[a,h]anthracene	0.063	0.26		<0.14										<0.079		
Dibenzofuran	NC	NC		<0.036										<0.02		
Diethylphthalate	NC	0.006		<0.14										<0.079		
Dimethylphthalate	NC	NC		<0.14										<0.079		
Di-n-butylphthalate	NC	0.058		<0.036										<0.02		
Di-n-octylphthalate	NC	NC		<0.14										<0.079		
Fluoranthene	0.6	5.1		0.35										<0.079		
Fluorene	0.019	0.54		<0.14										<0.079		
Hexachlorobenzene	NC	NC		<0.14										<0.079		
Hexachlorobutadiene	NC	0.0013		<0.14										<0.079		
Hexachlorocyclopentadiene	NC	NC		<0.28										<0.16		
Hexachloroethane	NC	0.073		<0.14										<0.079		
Indeno[1,2,3-cd]pyrene	0.2	NC		0.17										<0.079		
Isophorone	NC	NC		<0.14										<0.079		
Naphthalene	0.16	2.1		0.065										<0.02		
Nitrobenzene	NC	NC		<0.14										<0.079		
N-Nitroso-di-n-propylamine	NC	NC		<0.036										<0.02		
N-Nitrosodiphenylamine	NC	NC		<0.14										<0.079		
Pentachlorophenol	NC	0.017		<0.72										<0.4		
Phenanthrene	0.24	1.5		0.22										<0.079		
Phenol	NC	0.13		<0.14										<0.079		
Pyrene	0.665	2.6		0.59										<0.079		
Volatiles																
:TotalVolatileTic	NC	NC		0.17J										0.018J		

Analyte	Sample ID:		B1	B2 (D)	B3	B4 (D)	B5	B6	B7	B8 (D)	B9	B10	B11	B12	B13	B14
	LAB ID:		AC92394-001	AC92394-002	AC92394-003	AC92394-004	AC92394-005	AC92394-006	AC92394-007	AC92394-008	AC92394-009	AC92394-010	AC92394-011	AC92394-012	AC92394-013	AC92394-014
	Sample Depth (Inches below surface)		0-6	24	0-6	24	0-6	0-6	0-6	24	0-6	0-6	0-6	0-6	0-6	0-6
	ER-L (mg/kg)	ER-M (mg/kg)	Concentration (mg/Kg)													
1,1,1-Trichloroethane	NC	NC		<0.014										<0.0078		
1,1,2,2-Tetrachloroethane	NC	NC		<0.014										<0.0078		
1,1,2-Trichloro-1,2,2-trifluoroethane	NC	NC		<0.014										<0.0078		
1,1,2-Trichloroethane	NC	NC		<0.014										<0.0078		
1,1-Dichloroethane	NC	NC		<0.014										<0.0078		
1,1-Dichloroethene	NC	NC		<0.014										<0.0078		
1,2,3-Trichlorobenzene	NC	NC		<0.014										<0.0078		
1,2,4-Trichlorobenzene	NC	0.0048		<0.014										<0.0078		
1,2-Dibromo-3-chloropropane	NC	NC		<0.014										<0.0078		
1,2-Dibromoethane	NC	NC		<0.0072										<0.0039		
1,2-Dichlorobenzene	NC	0.013		<0.014										<0.0078		
1,2-Dichloroethane	NC	NC		<0.014										<0.0078		
1,2-Dichloropropane	NC	NC		<0.014										<0.0078		
1,3-Dichlorobenzene	NC	NC		<0.014										<0.0078		
1,4-Dichlorobenzene	NC	0.11		<0.014										<0.0078		
1,4-Dioxane	NC	NC		<0.72										<0.39		
2-Butanone	NC	NC		<0.014										<0.0078		
2-Hexanone	NC	NC		<0.014										<0.0078		
4-Methyl-2-pentanone	NC	NC		<0.014										<0.0078		
Acetone	NC	NC		<0.072										<0.039		
Benzene	NC	NC		<0.0072										<0.0039		
Bromochloromethane	NC	NC		<0.014										<0.0078		
Bromodichloromethane	NC	NC		<0.014										<0.0078		
Bromoform	NC	NC		<0.014										<0.0078		
Bromomethane	NC	NC		<0.014										<0.0078		
Carbon disulfide	NC	NC		0.024										<0.0078		
Carbon tetrachloride	NC	NC		<0.014										<0.0078		
Chlorobenzene	NC	NC		<0.014										<0.0078		
Chloroethane	NC	NC		<0.014										<0.0078		
Chloroform	NC	NC		<0.014										<0.0078		
Chloromethane	NC	NC		<0.014										<0.0078		
cis-1,2-Dichloroethene	NC	NC		<0.014										<0.0078		

Analyte	Sample ID:		B1	B2 (D)	B3	B4 (D)	B5	B6	B7	B8 (D)	B9	B10	B11	B12	B13	B14
	LAB ID:		AC92394-001	AC92394-002	AC92394-003	AC92394-004	AC92394-005	AC92394-006	AC92394-007	AC92394-008	AC92394-009	AC92394-010	AC92394-011	AC92394-012	AC92394-013	AC92394-014
	Sample Depth (Inches below surface)		0-6	24	0-6	24	0-6	0-6	0-6	24	0-6	0-6	0-6	0-6	0-6	0-6
	ER-L (mg/kg)	ER-M (mg/kg)	Concentration (mg/Kg)													
cis-1,3-Dichloropropene	NC	NC		<0.014										<0.0078		
Cyclohexane	NC	NC		<0.014										<0.0078		
Dibromochloromethane	NC	NC		<0.014										<0.0078		
Dichlorodifluoromethane	NC	NC		<0.014										<0.0078		
Ethylbenzene	NC	NC		<0.0072										<0.0039		
Isopropylbenzene	NC	NC		<0.0072										<0.0039		
m&p-Xylenes	NC	NC		<0.0072										<0.0039		
Methyl Acetate	NC	NC		<0.014										<0.0078		
Methylcyclohexane	NC	NC		<0.014										<0.0078		
Methylene chloride	NC	NC		<0.014										<0.0078		
Methyl-t-butyl ether	NC	NC		<0.0072										<0.0039		
o-Xylene	NC	NC		<0.0072										<0.0039		
Styrene	NC	NC		<0.014										<0.0078		
Tetrachloroethene	NC	NC		<0.014										<0.0078		
Toluene	2.5	NC		<0.0072										<0.0039		
trans-1,2-Dichloroethene	NC	NC		<0.014										<0.0078		
trans-1,3-Dichloropropene	NC	NC		<0.014										<0.0078		
Trichloroethene	NC	NC		<0.014										<0.0078		
Trichlorofluoromethane	NC	NC		<0.014										<0.0078		
Vinyl chloride	NC	NC		<0.014										<0.0078		
Xylenes (Total)	NC	NC		<0.0072										<0.0039		
Wet Chemistry																
% Solids	NC	NC		23										42		
Cyanide	NC	NC		<1										<0.57		
pH	NC	NC		6.4										6.7		
Total Organic Carbon	NC	NC		130,000										59,000		

- Results dry weight.
- All results reported in parts per million (mg/kg)
- J = Estimated concentration
- NC = No Criteria established

Results Exceed ER-L

Results Exceed ER-M

Table 7: Dioxin/Furan Sediment Sampling July 2016

	SAMPLE ID	**B-1**	**B-7**	**B-9**	**B-10**	**B-11**	**B-14**
	Hampton-Clark Lab ID	**AC92394-001**	**AC92394-007**	**AC92394-009**	**AC92394-010**	**AC92394-011**	**AC92394-014**
	Pace Analytical Lab ID	**10355913001**	**10355913002**	**10355913003**	**10355913004**	**10355913005**	**10355913006**
	SAMPLE INTERVAL (inches below ground surface)	**0-6**	**0-6**	**0-6**	**0-6**	**0-6**	**0-6**
ANALYTE (EPA Method 8290)	**AET (ppt)**	**Concentration (parts per trillion [ppt] or nanograms per kilogram [ng/kg])**					
2,3,7,8-TCDF	NC	8.3	4.8	8.7	7.3	4.3	<3.5
Total TCDF	NC	150.0	31.0	74.0	49.0	25.0	5.0
2,3,7,8-TCDD	NC	<1.2	<3.9	<2.7	<2.2	<1.6	<3.5
Total TCDD	NC	11.0	4.1	7.3	7.6	4.3	<3.5
1,2,3,7,8-PeCDF	NC	<6.0	<19.0	<14.0	<11.0	<7.9	<18.0
2,3,4,7,8-PeCDF	NC	21.0	<19.0	<14.0	<11.0	<7.9	<18.0
Total PeCDF	NC	260.0	<19.0	43.0	14.0	20.0	<18.0
1,2,3,7,8-TCDD	NC	<6.0	<19.0	<14.0	<11.0	<7.9	<18.0
Total PeCDD	NC	9.2	<19.0	<14.0	<11.0	<7.9	<18.0
1,2,3,4,7,8-HxCDF	NC	13.0	<19.0	<14.0	<11.0	<7.9	<18.0
1,2,3,6,7,8-HXCDF	NC	10.0	<19.0	<14.0	<11.0	<7.9	<18.0
2,3,4,6,7,8-HxCDF	NC	8.5	<19.0	<14.0	<11.0	<7.9	<18.0
1,2,3,7,8,9-HxCDF	NC	<6.0	<19.0	<14.0	<11.0	<7.9	<18.0
Total HxCDF	NC	180.0	<19.0	56.0	15.0	12.0	<18.0
1,2,3,4,7,8-HxCDD	NC	<6.0	<19.0	<14.0	<11.0	<7.9	<18.0
1,2,3,6,7,8-HxCDD	NC	9.0	<19.0	19.0	<11.0	<7.9	<18.0
1,2,3,7,8,9-HxCDD	NC	6.0	<19.0	22.0	<11.0	<7.9	<18.0
Total HxCDD	NC	87.0	71.0	190.0	84.0	57.0	<18.0
1,2,3,4,6,7,8-HpCDF	NC	76.0	26.0	89.0	30.0	2.7	<18.0
1,2,3,4,7,8,9-HpCDF	NC	<6.0	<19.0	<14.0	<11.0	<7.9	<18.0
Total HpCDF	NC	130.0	26.0	160.0	52.0	49.0	<18.0
1,2,3,4,6,7,8-HpCDD	NC	150.0	110.0	440.0	120.0	84.0	60.0
Total HpCDD	NC	310.0	230.0	1000.0	310.0	200.0	130.0
OCDF	NC	120.0	39.0	140.0	50.0	43.0	<35
OCDD	NC	9700.0	2500.0	11000.0	4000.0	2400.0	1400.0
Total 2,3,7,8,- TCDD (TEQ)*	3.6	**17.0**	**2.6**	**14.0**	**3.5**	**2.3**	**1.0**

Notes:

- Results dry weight.
- All results reported in parts per trillion (ng/kg)
- AET - Apparent Effects Threshold; Estuarine/ Marine Screening Criteria, NJDEP, 2009
- NC = No Criteria established

* TEQ Total 2,3,7,8,- TCDD Equivalence is the sum of the World Health Organization weighted factors for each congener

Exceeds AET

Table 8: Sediment Contamination Sampling Results December 2016

Analyte	Sample ID:		WCSB-01	WCSB-02	WCSB-03	WCSB-04	WCSB-05	WCSB-06	WCSB-07	WCSB-08	WCSB-09	WCSB-10
	LAB ID:		AC95422-001	AC95422-002	AC95422-003	AC95422-004	AC95422-005	AC95422-006	AC95422-007	AC95422-008	AC95422-009	AC95422-010
	Sample Depth (Inches below surface)		0-6	1-7	0-6	0-6	5-11	0-6	0-6	0-6	0-6	0-6
	ER-L (mg/kg)	ER-M (mg/kg)	Concentration (ppm)									
Metals												
Aluminum	NC	18000	**27000**	**33000**	**73000**	**31000**	**25000**	**55000**	**35000**	**35000**	**22000**	**35000**
Antimony	NC	9.3	<5	<5	<4	<5.3	<2.5	<2.3	<2.1	**18**	<5	<3.6
Arsenic	8.2	70	**35**	**63**	**50**	**34**	**38**	**100**	**30**	**35**	**56**	**50**
Barium	NC	48	<62	<62	**78**	<67	**1200**	**83**	**79**	**88**	<62	**100**
Beryllium	NC	NC	5.9	5.8	6.7	5.8	1.9	4.7	1.6	19	3.5	3.5
Cadmium	1.2	9.6	<2.5	<2.5	<2	<2.7	**2.9**	<1.1	<1	**20**	<2.5	<1.8
Calcium	NC	NC	8400	<6200	8000	7700	7400	4900	4400	4600	<6200	8000
Chromium	81	370	58	**140**	**330**	**83**	**260**	**380**	**170**	**230**	**100**	**390**
Cobalt	NC	10	**28**	**30**	**200**	**50**	**33**	**49**	**23**	**23**	**75**	**40**
Copper	34	270	**120**	**160**	**210**	**140**	**320**	**260**	**180**	**190**	**110**	**250**
Iron	NC	NC	37000	54000	110000	49000	86000	150000	79000	69000	47000	79000
Lead	47	218	**84**	**240**	**230**	**110**	**3500**	**360**	**260**	**290**	**120**	**320**
Magnesium	NC	NC	8700	5700	11000	8000	7600	11000	11000	12000	9600	16000
Manganese	NC	260	**660**	190	**11000**	180	**500**	**1100**	**650**	**400**	**620**	**420**
Mercury	0.15	0.71	<0.52	**1.5**	**0.71**	<0.56	**1**	**2.4**	**2.6**	**2.6**	**1.5**	**1.6**
Nickel	21	52	**59**	**61**	**240**	**100**	**70**	**94**	**56**	**62**	**89**	**100**
Potassium	NC	NC	5600	<3100	4700	3400	3400	5500	5600	6500	4300	7300
Selenium	NC	1	**16**	**15**	**16**	**17**	**7.5**	**16**	<5.1	**19**	<13	**16**
Silver	1	3.7	<1.2	**1.7**	<1	<1.3	**1.5**	**2**	**1.1**	<0.61	<1.2	**2.5**
Sodium	NC	NC	29000	14000	27000	24000	9600	20000	19000	25000	35000	56000
Thallium	NC	NC	<2.5	<2.5	<2	<2.7	<1.2	<1.1	<1	18	<2.5	<1.8
Vanadium	NC	57	**72**	**110**	**140**	<67	**190**	**160**	**120**	**130**	**85**	**140**
Zinc	150	410	**310**	**470**	**1300**	**550**	**1000**	**690**	**500**	**500**	**480**	**580**
Pesticides												
Aldrin	NC	NC	<0.031	<0.031	<0.025	<0.033	<0.16	<0.014	<0.013	<0.015	<0.031	<0.023
Alpha-BHC	NC	NC	<0.0063	<0.0063	<0.005	<0.0067	<0.031	<0.0029	<0.0026	<0.003	<0.0063	<0.0045
beta-BHC	NC	NC	<0.0063	<0.0063	<0.005	<0.0067	<0.031	<0.0029	<0.0026	<0.003	<0.0063	<0.0045
a-Chlordane	NC	NC	<0.031	0.053	<0.025	<0.033	<0.16	<0.014	<0.013	<0.015	<0.031	<0.023
Chlordane (Total)	0.007	6	<0.031	**0.053**	<0.025	<0.033	<0.16	<0.014	<0.013	<0.015	<0.031	<0.023
delta-BHC	NC	NC	<0.031	<0.031	<0.025	<0.033	<0.16	<0.014	<0.013	<0.015	<0.031	<0.023
Dieldrin	NC	NC	<0.0063	<0.0063	<0.005	<0.0067	<0.031	<0.0029	<0.0026	<0.003	<0.0063	<0.0045
Endosulfan I	NC	NC	<0.031	<0.031	<0.025	<0.033	<0.16	<0.014	<0.013	<0.015	<0.031	<0.023

Analyte	Sample ID:		WCSB-01	WCSB-02	WCSB-03	WCSB-04	WCSB-05	WCSB-06	WCSB-07	WCSB-08	WCSB-09	WCSB-10
	LAB ID:		AC95422-001	AC95422-002	AC95422-003	AC95422-004	AC95422-005	AC95422-006	AC95422-007	AC95422-008	AC95422-009	AC95422-010
	Sample Depth (Inches below surface)		0-6	1-7	0-6	0-6	5-11	0-6	0-6	0-6	0-6	0-6
	ER-L (mg/kg)	ER-M (mg/kg)	Concentration (ppm)									
Endosulfan II	NC	NC	<0.031	<0.031	<0.025	<0.033	<0.16	<0.014	<0.013	<0.015	<0.031	<0.023
Endosulfan Sulfate	NC	NC	<0.031	<0.031	<0.025	<0.033	<0.16	<0.014	<0.013	<0.015	<0.031	<0.023
Endrin	NC	NC	<0.031	<0.031	<0.025	<0.033	<0.16	<0.014	<0.013	<0.015	<0.031	<0.023
Endrin Aldehyde	NC	NC	<0.031	<0.031	<0.025	<0.033	<0.16	<0.014	<0.013	<0.015	<0.031	<0.023
Endrin Ketone	NC	NC	<0.031	<0.031	<0.025	<0.033	<0.16	<0.014	<0.013	<0.015	<0.031	<0.023
gamma-BHC	NC	NC	<0.0063	<0.0063	<0.005	<0.0067	<0.031	<0.0029	<0.0026	<0.003	<0.0063	<0.0045
Heptachlor	NC	0.0003	<0.031	<0.031	<0.025	<0.033	<0.16	<0.014	<0.013	<0.015	<0.031	<0.023
Heptachlor Epoxide	NC	NC	<0.031	<0.031	<0.025	<0.033	<0.16	<0.014	<0.013	<0.015	<0.031	<0.023
Methoxychlor	NC	NC	<0.031	<0.031	<0.025	<0.033	<0.16	<0.014	<0.013	<0.015	<0.031	<0.023
p,p'-DDD	NC	0.02	<0.016	<0.016	<0.013	<0.017	**0.14**	<0.0071	0.0075	0.0084	<0.016	<0.011
p,p'-DDE	NC	0.027	<0.016	<0.016	<0.013	**0.043**	**0.092**	<0.0071	<0.0064	<0.0076	<0.016	<0.011
p,p'-DDT	0.001	0.007	<0.016	<0.016	<0.013	<0.017	**0.17**	<0.0071	<0.0064	<0.0076	<0.016	<0.011
Toxaphene	NC	NC	<0.16	<0.16	<0.13	<0.17	<0.78	<0.071	<0.064	<0.076	<0.16	<0.11
y-Chlordane	NC	NC	<0.031	<0.031	<0.025	<0.033	<0.16	<0.014	<0.013	<0.015	<0.031	<0.023
Semi-Volatiles												
:TotalSemiVolatileTic	NC	NC	<NA	<NA	<NA	<NA	<NA	<NA	<NA	<NA	<NA	<NA
1,1'-Biphenyl	NC	NC	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
1,2,4,5-Tetrachlorobenzene	NC	NC	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
2,3,4,6-Tetrachlorophenol	NC	NC	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
2,4,5-Trichlorophenol	NC	0.003	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
2,4,6-Trichlorophenol	NC	0.006	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
2,4-Dichlorophenol	NC	0.005	<0.052	<0.052	<0.042	<0.056	<0.026	<0.024	<0.064	<0.076	<0.052	<0.038
2,4-Dimethylphenol	NC	NC	<0.052	<0.052	<0.042	<0.056	<0.026	<0.024	<0.064	<0.076	<0.052	<0.038
2,4-Dinitrophenol	NC	NC	<1	<1	<0.83	<1.1	<0.52	<0.48	<1.3	<1.5	<1	<0.76
2,4-Dinitrotoluene	NC	NC	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
2,6-Dinitrotoluene	NC	NC	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
2-Chloronaphthalene	NC	NC	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
2-Chlorophenol	NC	0.008	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
2-Methylnaphthalene	0.07	0.67	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
2-Methylphenol	NC	NC	<0.052	<0.052	<0.042	<0.056	<0.026	<0.024	<0.064	<0.076	<0.052	<0.038
2-Nitroaniline	NC	NC	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
2-Nitrophenol	NC	NC	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
3&4-Methylphenol	NC	NC	<0.052	<0.052	<0.042	<0.056	<0.026	<0.024	<0.064	<0.076	<0.052	<0.038
3,3'-Dichlorobenzidine	NC	NC	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15

Analyte	Sample ID:		WCSB-01	WCSB-02	WCSB-03	WCSB-04	WCSB-05	WCSB-06	WCSB-07	WCSB-08	WCSB-09	WCSB-10
	LAB ID:		AC95422-001	AC95422-002	AC95422-003	AC95422-004	AC95422-005	AC95422-006	AC95422-007	AC95422-008	AC95422-009	AC95422-010
	Sample Depth (Inches below surface)		0-6	1-7	0-6	0-6	5-11	0-6	0-6	0-6	0-6	0-6
	ER-L (mg/kg)	ER-M (mg/kg)	Concentration (ppm)									
3-Nitroaniline	NC	NC	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
4,6-Dinitro-2-methylphenol	NC	NC	<1	<1	<0.83	<1.1	<0.52	<0.48	<1.3	<1.5	<1	<0.76
4-Bromophenyl-phenylether	NC	NC	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
4-Chloro-3-methylphenol	NC	NC	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
4-Chloroaniline	NC	NC	<0.052	<0.052	<0.042	<0.056	<0.026	<0.024	<0.064	<0.076	<0.052	<0.038
4-Chlorophenyl-phenylether	NC	NC	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
4-Nitroaniline	NC	NC	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
4-Nitrophenol	NC	NC	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
Acenaphthene	0.016	0.5	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
Acenaphthylene	0.044	0.64	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
Acetophenone	NC	NC	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
Anthracene	0.85	1.1	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
Atrazine	NC	NC	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
Benzaldehyde	NC	NC	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
Benzo[a]anthracene	0.261	1.6	<0.21	<0.21	<0.17	<0.22	0.17	0.14	<0.26	<0.3	<0.21	<0.15
Benzo[a]pyrene	0.43	1.6	<0.21	<0.21	<0.17	<0.22	0.17	0.21	<0.26	<0.3	<0.21	<0.15
Benzo[b]fluoranthene	NC	NC	<0.21	<0.21	0.19	<0.22	0.28	0.34	<0.26	0.31	<0.21	0.15
Benzo[g,h,i]perylene	0.17	320	<0.21	<0.21	<0.17	<0.22	**0.19**	**0.22**	<0.26	<0.3	<0.21	<0.15
Benzo[k]fluoranthene	0.24	1340	<0.21	<0.21	<0.17	<0.22	<0.1	0.13	<0.26	<0.3	<0.21	<0.15
bis(2-Chloroethoxy)methane	NC	NC	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
bis(2-Chloroethyl)ether	NC	NC	<0.052	<0.052	<0.042	<0.056	<0.026	<0.024	<0.064	<0.076	<0.052	<0.038
bis(2-Chloroisopropyl)ether	NC	NC	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
bis(2-Ethylhexyl)phthalate	0.18216	2.64651	<0.21	**0.4**	**0.2**	**0.35**	**0.57**	**0.28**	<0.26	<0.3	<0.21	**0.43**
Butylbenzylphthalate	NC	0.063	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
Caprolactam	NC	NC	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
Carbazole	NC	NC	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
Chrysene	0.384	2.8	<0.21	<0.21	<0.17	<0.22	0.21	0.23	<0.26	<0.3	<0.21	<0.15
Dibenzo[a,h]anthracene	0.063	0.26	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
Dibenzofuran	NC	NC	<0.052	<0.052	<0.042	<0.056	<0.026	<0.024	<0.064	<0.076	<0.052	<0.038
Diethylphthalate	NC	0.006	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
Dimethylphthalate	NC	NC	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
Di-n-butylphthalate	NC	0.058	<0.052	<0.052	<0.042	<0.056	<0.026	<0.024	<0.064	<0.076	<0.052	<0.038
Di-n-octylphthalate	NC	NC	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
Fluoranthene	0.6	5.1	<0.21	<0.21	<0.17	<0.22	0.33	0.31	<0.26	<0.3	<0.21	<0.15

Analyte	Sample ID:		WCSB-01	WCSB-02	WCSB-03	WCSB-04	WCSB-05	WCSB-06	WCSB-07	WCSB-08	WCSB-09	WCSB-10
	LAB ID:		AC95422-001	AC95422-002	AC95422-003	AC95422-004	AC95422-005	AC95422-006	AC95422-007	AC95422-008	AC95422-009	AC95422-010
	Sample Depth (Inches below surface)		0-6	1-7	0-6	0-6	5-11	0-6	0-6	0-6	0-6	0-6
	ER-L (mg/kg)	ER-M (mg/kg)	Concentration (ppm)									
Fluorene	0.019	0.54	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
Hexachlorobenzene	NC	NC	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
Hexachlorobutadiene	NC	0.0013	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
Hexachlorocyclopentadiene	NC	NC	<0.49	<0.49	<0.39	<0.52	<0.25	<0.22	<0.6	<0.71	<0.49	<0.36
Hexachloroethane	NC	0.073	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
Indeno[1,2,3-cd]pyrene	0.2	320	<0.21	<0.21	<0.17	<0.22	0.12	0.18	<0.26	<0.3	<0.21	<0.15
Isophorone	NC	NC	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
Naphthalene	0.16	2.1	<0.052	<0.052	<0.042	<0.056	<0.026	<0.024	<0.064	<0.076	<0.052	<0.038
Nitrobenzene	NC	NC	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
N-Nitroso-di-n-propylamine	NC	NC	<0.052	<0.052	<0.042	<0.056	<0.026	<0.024	<0.064	<0.076	<0.052	<0.038
N-Nitrosodiphenylamine	NC	NC	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
Pentachlorophenol	NC	0.017	<1	<1	<0.83	<1.1	<0.52	<0.48	<1.3	<1.5	<1	<0.76
Phenanthrene	0.24	1.5	<0.21	<0.21	<0.17	<0.22	0.17	<0.095	<0.26	<0.3	<0.21	<0.15
Phenol	NC	0.13	<0.21	<0.21	<0.17	<0.22	<0.1	<0.095	<0.26	<0.3	<0.21	<0.15
Pyrene	0.665	2.6	<0.21	<0.21	<0.17	<0.22	0.3	0.28	<0.26	<0.3	<0.21	<0.15
Volatiles												
:TotalVolatileTic	NC	NC	<NA	<NA	<NA	<NA	<NA	<NA	<NA	<NA	<NA	<NA
1,1,1-Trichloroethane	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
1,1,2,2-Tetrachloroethane	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
1,1,2-Trichloro-1,2,2-trifluoroethane	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
1,1,2-Trichloroethane	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
1,1-Dichloroethane	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
1,1-Dichloroethene	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
1,2,3-Trichlorobenzene	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
1,2,4-Trichlorobenzene	NC	0.0048	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
1,2-Dibromo-3-chloropropane	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
1,2-Dibromoethane	NC	NC	<0.0097	<0.01	<0.0074	<0.011	<0.0043	<0.0043	<0.004	<0.0052	<0.011	<0.0071
1,2-Dichlorobenzene	NC	0.013	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
1,2-Dichloroethane	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
1,2-Dichloropropane	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
1,3-Dichlorobenzene	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
1,4-Dichlorobenzene	NC	0.11	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
1,4-Dioxane	NC	NC	<0.97	<1	<0.74	<1.1	<0.43	<0.43	<0.4	<0.52	<1.1	<0.71

Analyte	Sample ID:		WCSB-01	WCSB-02	WCSB-03	WCSB-04	WCSB-05	WCSB-06	WCSB-07	WCSB-08	WCSB-09	WCSB-10
	LAB ID:		AC95422-001	AC95422-002	AC95422-003	AC95422-004	AC95422-005	AC95422-006	AC95422-007	AC95422-008	AC95422-009	AC95422-010
	Sample Depth (Inches below surface)		0-6	1-7	0-6	0-6	5-11	0-6	0-6	0-6	0-6	0-6
	ER-L (mg/kg)	ER-M (mg/kg)	Concentration (ppm)									
2-Butanone	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
2-Hexanone	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
4-Methyl-2-pentanone	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
Acetone	NC	NC	<0.097	<0.1	<0.074	<0.11	<0.043	<0.043	<0.04	<0.052	<0.11	<0.071
Benzene	NC	NC	<0.0097	<0.01	<0.0074	<0.011	<0.0043	<0.0043	<0.004	<0.0052	<0.011	<0.0071
Bromochloromethane	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
Bromodichloromethane	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
Bromoform	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
Bromomethane	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
Carbon disulfide	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
Carbon tetrachloride	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
Chlorobenzene	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
Chloroethane	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
Chloroform	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
Chloromethane	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
cis-1,2-Dichloroethene	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
cis-1,3-Dichloropropene	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
Cyclohexane	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
Dibromochloromethane	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
Dichlorodifluoromethane	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
Ethylbenzene	NC	NC	<0.0097	<0.01	<0.0074	<0.011	<0.0043	<0.0043	<0.004	<0.0052	<0.011	<0.0071
Isopropylbenzene	NC	NC	<0.0097	<0.01	<0.0074	<0.011	<0.0043	<0.0043	<0.004	<0.0052	<0.011	<0.0071
m&p-Xylenes	NC	NC	<0.0097	<0.01	<0.0074	<0.011	<0.0043	<0.0043	<0.004	<0.0052	<0.011	<0.0071
Methyl Acetate	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
Methylcyclohexane	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
Methylene chloride	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
Methyl-t-butyl ether	NC	NC	<0.0097	<0.01	<0.0074	<0.011	<0.0043	<0.0043	<0.004	<0.0052	<0.011	<0.0071
o-Xylene	NC	NC	<0.0097	<0.01	<0.0074	<0.011	<0.0043	<0.0043	<0.004	<0.0052	<0.011	<0.0071
Styrene	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
Tetrachloroethene	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
Toluene	2.5	NC	<0.0097	<0.01	<0.0074	<0.011	<0.0043	<0.0043	<0.004	<0.0052	<0.011	<0.0071
trans-1,2-Dichloroethene	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
trans-1,3-Dichloropropene	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
Trichloroethene	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014

Analyte	Sample ID:		WCSB-01	WCSB-02	WCSB-03	WCSB-04	WCSB-05	WCSB-06	WCSB-07	WCSB-08	WCSB-09	WCSB-10
	LAB ID:		AC95422-001	AC95422-002	AC95422-003	AC95422-004	AC95422-005	AC95422-006	AC95422-007	AC95422-008	AC95422-009	AC95422-010
	Sample Depth (Inches below surface)		0-6	1-7	0-6	0-6	5-11	0-6	0-6	0-6	0-6	0-6
	ER-L (mg/kg)	ER-M (mg/kg)	Concentration (ppm)									
Trichlorofluoromethane	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
Vinyl chloride	NC	NC	<0.019	<0.021	<0.015	<0.021	<0.0086	<0.0087	<0.0081	<0.01	<0.022	<0.014
Xylenes (Total)	NC	NC	<0.0097	<0.01	<0.0074	<0.011	<0.0043	<0.0043	<0.004	<0.0052	<0.011	<0.0071
Wet Chemistry												
% Solids	NC	NC	16%	16%	20%	15%	32%	35%	39%	33%	16%	22%
Cyanide	NC	NC	<1.5	<1.5	2.3	<1.6	<0.75	<0.69	<0.62	<0.73	<1.5	<1.1
pH	NC	NC	6.3	7	7.2	6.8	6.8	6.5	6.6	6.4	6.9	7
Total Organic Carbon (mg/kg)	NC	NC	360000 (36%)	270000 (27%)	170000 (17%)	290000 (29%)	230000 (23%)	40000 (4%)	42000 (4.2%)	51000 (5.1%)	150000 (15%)	140000 (14%)

- Results dry weight.
- All results reported in parts per million (mg/kg)
- J = Estimated concentration
- NC = No Criteria established

Results Exceed ER-L
Results Exceed ER-M

Table 9: Dioxin/Furan Sediment Sampling Results December 2016

	Sample ID	WCSB-01	WCSB-02	WCSB-03	WCSB-04	WCSB-05	WCSB-06	WCSB-07	WCSB-08	WCSB-09	WCSB-10
	Lab ID	10374907001	10374907001	10374907001	10374907001	10374907001	10374907001	10374907001	10374907001	10374907001	10374907001
Sample Interval (inches below ground surface)		0-6	1-7	0-6	0-6	5-11	0-6	0-6	0-6	0-6	0-6
Analyte	AET (ppt)	Concentration (parts per trillion)									
2,3,7,8-TCDF	NC	5.4	17.0	8.4	7.5	30.0	16.0	13.0	18.0	7.6	11.0
Total TCDF	NC	77.0	240.0	75.0	120.0	400.0	140.0	110.0	140.0	80.0	120.0
2,3,7,8-TCDD	NC	<3.4	<3.8	<3.2	<4.0	4.0	3.9	3.3	4.4	<3.2	2.8
Total TCDD	NC	5.2	44.0	5.2	4.6	61.0	46.0	26.0	41.0	9.6	19.0
1,2,3,7,8-PeCDF	NC	<17.0	<19.0	<16.0	<20.0	16.0	<8.4	<7.7	<8.5	<16.0	<13.0
2,3,4,7,8-PeCDF	NC	<17.0	<19.0	<16.0	<20.0	59.0	12.0	<7.7	<8.5	<16.0	<13.0
Total PeCDF	NC	19.0	120.0	70.0	68.0	730.0	150.0	66.0	93.0	58.0	34.0
1,2,3,7,8-TCDD	NC	<17.0	<19.0	<16.0	<20.0	10.0	<8.4	<7.7	<8.5	<16.0	<13.0
Total PeCDD	NC	<17.0	29.0	<16.0	<20.0	100.0	60.0	24.0	54.0	<16.0	16.0
1,2,3,4,7,8-HxCDF	NC	<17.0	<19.0	<16.0	<20.0	58.0	32.0	9.6	12.0	<16.0	<13.0
1,2,3,6,7,8-HXCDF	NC	<17.0	<19.0	<16.0	<20.0	31.0	14.0	<7.7	<8.5	<16.0	<13.0
2,3,4,6,7,8-HxCDF	NC	<17.0	<19.0	<16.0	<20.0	42.0	14.0	<7.7	<8.5	<16.0	<13.0
1,2,3,7,8,9-HxCDF	NC	<17.0	<19.0	<16.0	<20.0	17.0	<8.4	<7.7	<8.5	<16.0	<13.0
Total HxCDF	NC	<17.0	70.0	69.0	83.0	1900.0	230.0	73.0	91.0	66.0	52.0
1,2,3,4,7,8-HxCDD	NC	<17.0	<19.0	<16.0	<20.0	12.0	11.0	<7.7	<8.5	<16.0	<13.0
1,2,3,6,7,8-HxCDD	NC	<17.0	21.0	20.0	<20.0	54.0	35.0	19.0	24.0	21.0	22.0
1,2,3,7,8,9-HxCDD	NC	<17.0	<19.0	<16.0	<20.0	24.0	23.0	14.0	17.0	18.0	28.0
Total HxCDD	NC	<17.0	220.0	160.0	100.0	560.0	370.0	240.0	330.0	20.0	260.0
1,2,3,4,6,7,8-HpCDF	NC	75.0	91.0	100.0	83.0	2400.0	270.0	79.0	110.0	86.0	80.0
1,2,3,4,7,8,9-HpCDF	NC	33.0	<19.0	<16.0	<20.0	37.0	12.0	<7.7	<8.5	<16.0	<13.0
Total HpCDF	NC	56.0	150.0	180.0	180.0	4800.0	440.0	150.0	190.0	170.0	140.0
1,2,3,4,6,7,8-HpCDD	NC	130.0	310.0	320.0	300.0	1800.0	650.0	270.0	370.0	410.0	450.0
Total HpCDD	NC	310.0	650.0	690.0	590.0	3600.0	1600.0	710.0	990.0	830.0	1100.0
OCDF	NC	37.0	120.0	150.0	130.0	1100.0	460.0	130.0	170.0	130.0	130.0
OCDD	NC	3200.0	12000.0	7700.0	5300.0	22000.0	16000.0	8500.0	12000.0	6700.0	11000.0
Total 2,3,7,8-TCDD Equivalence	**3.6**	**3.2**	**12.0**	**9.4**	**6.2**	**110.0**	**37.0**	**15.0**	**20.0**	**12.0**	**18.0**

Notes:

- Results dry weight.
- All results reported in parts per trillion (ng/kg)
- AET - Apparent Effects Threshold; Estuarine/ Marine Screening Criteria, NJDEP, 2009
- NC = No Criteria established

* TEQ Total 2,3,7,8,- TCDD Equivalence is the sum of the World Health Organization weighted factors for each congener

Exceeds AET

3.4.7.2 PCB Congener Summary

The December 2016 sediment samples were analyzed for PCB congeners using USEPA Method 1668A by the SGS North America laboratory.

The laboratory calculated the toxicity equivalence (TEQ) for these dioxin-like PCBs in each sample by multiplying the PCB congener concentration by its toxicity equivalence factor (TEF) to determine a toxicity equivalence concentration (TEC) and summing the TECs of the congeners to determine a TEQ. The TEFs were established by the World Health Organization (WHO) in 1998 and updated in 2005, to assess mammalian (including human health), avian and fish species risks from exposure to dioxin-like compounds (Van den Berg 2006; USEPA 2016). Only mammalian values were used in the laboratory analysis. The mammalian TEFs do not incorporate all appropriate values for assessing ecological risks to all potential receptors, i.e. bird and fish species.

The laboratory calculated the TECs under different scenarios, depending on how non-detect (ND) concentrations and concentrations with a qualifier of "estimated maximum possible concentration (EMPC)" are treated. In these scenarios, non-detect concentrations are applied as a zero value, half of the detection limit (DL) or the full DL and the EMPC qualified values are applied as either detected or non-detect. Laboratory TEF values used were verified using the 2005 WHO TEFs. The calculated TEQs range from 0.0138 nanograms per kilogram (ng/kg) in sample WCSB-08 to 7.51 ng/kg in sample WCSB-05. See Table C.4 for the laboratory's TEQs for each sediment sample.

The laboratory's method of treating non-detect concentrations and EMPC-qualified concentrations in the TEC calculations introduces a variation to concentrations used (i.e., ND, ½ the DL, DL). In contrast, the current USEPA method employs the Kaplan Meier (KM) product limit estimator, which is based on the relationship between the mean of the TECs and total TEQ for each sample, for the treatment of non-detect concentrations in the USEPA Basic TEQ calculator (USEPA 2016b). Whale Creek sediment data was input into USEPA's calculator as an alternative method of evaluating the dioxin-like PCB data; the resulting TEQs range from 0.3178 to 6.8687 ng/kg, as presented in Table C.5. This range varies from the laboratory's TEQ results, as expected due to the differences in the way the NDs were handled (e.g., given a value of zero, half the detection limit) between the two methods.

The TEQs from the laboratory and those calculated by HDR using USEPA's TEQ calculator were compared to the AET of 3.6 ng/kg for 2,3,7,8 TCDD. All of the TEQs are below this criterion, with the exception of sample WCSB-05. This sample has TEQs above the criterion in the scenarios where EMPC qualified concentrations were considered detected in the lab's calculations and where HDR used the USEPA TEQ calculator.

3.4.7.3 Fish Tissue Sampling

Whole-body tissue analysis was conducted on three samples of common mummichog (*Fundulus heteroclitus*) collected from the Bank Site that were co-located with sediment contamination samples WCSB-04, WCSB-06 and WCSB-08 (Attachment A, Figure 14). Analyses included metals, pesticides, dioxins/furans, PCBs, and percent lipids, PCB congener

and dioxins/furans analysis. Results of tissue analysis are presented below in Table 10 and laboratory results can be found in Attachment D.

With the exception of copper (Cu), whole-body tissue contaminant concentrations were less than those considered adverse in the *Lower Eight Miles of the Lower Passaic River Risk Assessment* (U.S. Environmental Protection Agency and U.S. Army Corps of Engineers, Louis Berger Group 2014). Lead, mercury, dieldrin, and Total DDx concentrations were well below literature-derived Low Observed Adverse Effects Levels (LOAEL) (Table 10). PCB congener and dioxin/furan values did not exceed NOAEL (No Observed Adverse Effects Level) and LOAEL concentrations for Total PCBs and 2,3,7,8 TCDD, respectively. However, Cu concentrations were observed at levels that could potentially impact fish survival (Zyadah and Abdel-Baky 2000).

Cu uptake and toxicity in mummichogs is strongly associated with osmoregulatory function, with highest uptake rates and toxicity documented in low-salinity (<5 ppt) waters, and the lowest documented under brackish to mesohaline conditions (Blanchard and Gossel 2005, 2006). Furthermore, the physiology of Cu toxicity appears to differ in fresh vs. saline waters; although the exact mechanism is poorly understood, both sub-lethal and acute effects are associated with disruption of nitrogen metabolism in mummichogs exposed to Cu at varying salinities in the laboratory (Blanchard and Gossel 2005).

Surface water salinity at the Bank site ranges from 10-15 ppt (under normal, early summer weather/flow). These environmental conditions would favor relatively low Cu uptake and toxicity (Blanchard and Gossel 2005, 2006). In a laboratory study, mummichogs exposed to high concentrations of Cu (over a 30-day period) accumulated whole-body tissue concentrations ranging from 5.40 ppm (11 ppt salinity) to 13.59 ppm (5 ppt salinity) (Blanchard and Goshell 2005). The latter values are comparable to the mummichog tissue Cu concentrations observed at the Bank site. The observed whole-body tissue concentrations from the Bank site are also comparable to reported tissue Cu concentrations (11.76 ppm) in mummichogs from the nearby Hackensack Meadowlands (Weis 2005).

Because of the time of year (and limited activity of target species due to colder water temperatures), mummichogs at the Bank site were concentrated at the upper reaches of tidal creeks and in isolated pools close to the edges of the site which abuts Route 35, adjacent to residential and commercial development. Future collections at this site during summer months (should this Bank site be developed) could shed more light on nearby sources of Cu, and observed elevated tissue concentrations in resident fish.

Table 10: Fish Tissue Analysis Concentrations compared to Critical Body Residues (EPA/ACOE Passaic River Study, Louis Berger Group 2014)

Analyte	No Observed Adverse Effects Level (NOAEL)[1]	Low Observed Adverse Effects Level (LOAEL)[1]	WC-FISH-1	WC-FISH-2	WC-FISH-3	Source
Metals			**Concentration (mg/kg)**			
Aluminum	NA	NA	51.0J	58	45.3J	
Antimony	5	9	0.120J	0.078J	0.063J	Jarvinen and Ankley 1999
Arsenic	3.4	5.4	0.721	0.522	0.479J	Jarvinen and Ankley 1999
Barium	NA	NA	1.51	1.55	1.25	
Beryllium	NA	NA	<0.269	<0.258	<0.275	
Cadmium	0.11	0.3	<0.108	<0.103	<0.11	Jarvinen and Ankley 1999
Calcium	NA	NA	19100	15300	13900	
Chromium	NA	NA	0.625	0.344	0.318	
Cobalt	NA	NA	0.087J	0.070J	0.057J	
Copper	0.32	1.5	**4.64**	**4.01**	**3.38**	Louis Berger Group 2014
Iron	NA	NA	135	115	97.6	
Lead	0.4	4	0.177	0.164	0.126	Louis Berger Group 2014
Magnesium	NA	NA	602	481	432	
Manganese	NA	NA	19.1	16	13	
Mercury	0.052	0.26	0.015	0.015	0.013J	Louis Berger Group 2014
Nickel	8	40	0.219J	0.153J	0.116J	Jarvinen and Ankley 1999
Potassium	NA	NA	3720	3010	2590	
Selenium	9.5	19	0.718	0.652	0.456J	Jarvinen and Ankley 1999
Silver	0.06	NA	0.121J	0.096J	0.074J	Jarvinen and Ankley 1999
Sodium	NA	NA	2160	1800	1620	
Thallium	NA	NA	<0.108	<0.103	<0.11	

Analyte	No Observed Adverse Effects Level (NOAEL)[1]	Low Observed Adverse Effects Level (LOAEL)[1]	WC-FISH-1	WC-FISH-2	WC-FISH-3	Source
Vanadium	5.74	NA	0.282J	0.269J	0.153J	Jarvinen and Ankley 1999
Zinc	NA	NA	54.6	43.6	40	
Organics			**Concentration (µg/kg)**			
DDx Total	78	390	27.681	33.914	30.917	Louis Berger Group 2014
Aldrin	NA	NA	<0.375	<0.385	<0.362	
BHC Total	NA	48.6	0.756	0.685	1.09	Jarvinen and Ankley 1999
alpha-Chlordane	NA	NA	1.98	2.47	2.63	
Dieldrin	8	40	2.82	2.99	2.83	Louis Berger Group 2014
Endosulfan I	200	260	<0.375	<0.385	<0.362	Jarvinen and Ankley 1999
Endosulfan II	200	260	<0.375	<0.385	<0.362	Jarvinen and Ankley 1999
Endosulfan sulfate	NA	NA	<0.375	<0.385	<0.362	
Endrin	110	880	<0.375	<0.385	<0.362	Jarvinen and Ankley 1999
Endrin aldehyde	NA	NA	<1.12	<1.16	<1.09	
Endrin keytone	NA	NA	<0.375	<0.385	<0.362	
gamma-Chlordane	NA	NA	<0.375	<0.385	<0.362	
Heptachlor	5300	11500	<0.375	<0.385	<0.362	Jarvinen and Ankley 1999
Heptachlor epoxied (B)	NA	NA	1.2	<0.771	0.922	
Methoxychlor	6	1640	<3.75	<3.85	<3.62	Jarvinen and Ankley 1999
Toxaphene	2100	6100	<18.8	<19.3	<18.2	Jarvinen and Ankley 1999
Chlordane	NA	NA	<18.8	<19.3	<18.2	
Dioxins/Furans			**Concentration (pg/g)**			
2, 3, 7, 8 –TCDD	0.89	1.8	<0.944	<0.998	<0.988	Louis Berger Group 2014
1,2,3,7,8-PeCDD	NA	NA	<4.72	<4.99	<4.94	
1,2,3,4,7,8-HxCDD	NA	NA	<4.72	<4.99	<4.94	
1,2,3,6,7,8-HxCDD	NA	NA	<4.72	<4.99	<4.94	
1,2,3,7,8,9-HxCDD	NA	NA	<4.72	<4.99	<4.94	

Analyte	No Observed Adverse Effects Level (NOAEL)[1]	Low Observed Adverse Effects Level (LOAEL)[1]	WC-FISH-1	WC-FISH-2	WC-FISH-3	Source
1,2,3,4,6,7,8-HpCDD	NA	NA	<4.72	<4.99	<4.94	
1,2,3,4,6,7,8,9-OCDD	NA	NA	<9.44	<9.98	<9.88	
2,3,7,8-TCDF	NA	NA	<0.944	<0.998	<0.988	
1,2,3,7,8-PeCDF	NA	NA	<4.72	<4.99	<4.94	
2,3,4,7,8-PeCDF	NA	NA	<4.72	<4.99	<4.94	
1,2,3,4,7,8-HxCDF	NA	NA	<4.72	<4.99	<4.94	
1,2,3,6,7,8-HxCDF	NA	NA	<4.72	<4.99	<4.94	
2,3,4,6,7,8-HxCDF	NA	NA	<4.72	<4.99	<4.94	
1,2,3,7,8,9-HxCDF	NA	NA	<4.72	<4.99	<4.94	
1,2,3,4,6,7,8-HpCDF	NA	NA	<4.72	<4.99	<4.94	
1,2,3,4,7,8,9-HpCDF	NA	NA	<4.72	<4.99	<4.94	
1,2,3,4,6,7,8,9-OCDF	NA	NA	<9.44	<9.98	<9.88	
TEQ WHO2005 ND = 0	NA	NA	0	0	0	
TEQ WHO2005 ND = 0.5 of DL	NA	NA	5.39	5.69	5.64	
PCBs[2]			**Concentration (pg/g)**			
77-TeCB	NA	NA	28	37.9	30.4	
81-TeCB	NA	NA	<9.31	<9.52	<19.1	
105-PeCB	NA	NA	2160	2240	2020	
114-PeCB	NA	NA	101	102	96.3	
118-PeCB	NA	NA	7710	7830	6910	
123-PeCB	NA	NA	96	87.3	89.3	
126-PeCB	NA	NA	21.7	19.3	<19.1	
156-HxCB	NA	NA	620	629	589	
157-HxCB	NA	NA	620	629	589	
167-HxCB	NA	NA	411	414	389	
169-HxCB	NA	NA	<9.31	<9.52	<19.1	

Analyte	No Observed Adverse Effects Level (NOAEL)[1]	Low Observed Adverse Effects Level (LOAEL)[1]	WC-FISH-1	WC-FISH-2	WC-FISH-3	Source
189-HpCB	NA	NA	27.2	28	26.5	
PCB Congener TEQ ND = 0	0.89	1.8	0.170026	0.1600865	0.0565855	
PCB Congener TEQ ND = 0.5 of DL	0.89	1.8	0.17258625	0.1627045	0.109588	
Total PCBs*	170000	530000	0.121	0.125	0.115	Louis Berger Group 2014
Inorganics and Miscellaneous						
Percent Moisture	NA	NA	77.4	77	77.8	
Percent Lipids	NA	NA	2.82	4.55	3.36	

J - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
1 – NOAEL and LOAEL for critical body residue as published by Louis Berger 2014 and Jarvis and Ankley 1999
2 - Note “Total PCBs” is the result of the sum of 209 congeners

3.4.8 Threatened and Endangered Species

The proposed mitigation bank is within the habitat range of several protected wildlife species (Attachment A, Figure 15). Coordination with the NJDEP's Natural Heritage Program in a letter dated January 26, 2017 indicated that the emergent wetlands on the bank site proper can provide habitat for many of these species, including glossy ibis (*Plegadis falcinellus*; NJ-special concern [SC]), snowy egret (*Egretta thula*; NJ-SC), and black-crowned night heron (*Nycticorax nycticorax*; NJ-threatened). There is forested wetland habitat adjacent to the bank site. However, the New Jersey Landscape Project does not designate any species as documented in this area. Additionally, a number of additional species are also known to be present within one mile of the proposed mitigation site (Table 11).

Table 11: Summary of Threatened, Endangered or Special Concern or Tracked Species or Habitat at and within One Mile of the Evergreen Whale Creek Mitigation Bank

Common Name	Scientific Name	Status[1]	Feature Type
At the Project Site/In Immediate Vicinity			
Black-crowned Night Heron	*Nycticorax nycticorax*	State Threatened	Foraging
Glossy Ibis	*Plegadis falcinellus*	State Special Concern	Foraging
Osprey	*Pandion haliateus*	State Threatened	Foraging
Snowy Egret	*Egretta thula*	State Special Concern	Foraging
Within One Mile of the Project Site			
Atlantic Loggerhead	*Caretta caretta*	State Endangered, Federally Threatened	Occupied Habitat
Bald Eagle	*Haliaeetus leucocephalus*	State Endangered	Foraging
Black-crowned Night Heron	*Nycticorax nycticorax*	State Threatened	Foraging
Glossy Ibis	*Plegadis falcinellus*	State Special Concern	Foraging
Least Tern	*Sternula antillarum*	State Endangered	Foraging
Little Blue Heron	*Egretta caerulea*	State Special Concern	Foraging
Osprey	*Pandion haliateus*	State Threatened	Foraging/Nesting
Pine Barrens Treefrog	*Hyla andersonii*	State Threatened	Vernal Pool Breeding
Snowy Egret	*Egretta thula*	State Special Concern	Foraging
Yellow-Crowned Night-Heron	*Nyctanassa violacea*	State Threatened	Foraging
		State Threatened	Nesting Colony

Source: NJDEP Natural Heritage Program consultation dated January 26, 2017. Rare Wildlife Species or Wildlife Habitat on the Project Site and within One Mile of the Project Site Based on Search of Landscape Project 3.1 Species Based Patches.

In addition to NHP Correspondence, a United States Fish and Wildlife Service (USFWS) Official Species List (OSL) indicated that four species were listed as threatened for the Whale Creek Mitigation Bank Site project area. The bird red knot (*Calidris canutus rufa*), flowering plants seabeach amaranth (*Amaranthus pumilus*) and swamp pink (*Helonias bullata*), and the northern long-eared bat (*Myotis septentrionalis*) are all listed as threatened by the USFWS OSL. Lastly, a letter to the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) was sent on February 3, 2017 requesting available information on threatened and endangered species and essential fish habitat (EFH). NMFS identified no threatened and endangered species within the project area. EFH was identified within the project area and a full EFH consultation will be conducted for future submittals as requested NMFS consultation. EFH species listed by NMFS can be found in Table 12 below. All Agency Correspondence can be found in Attachment E.

Table 12: EFH Species and Lifestages Identified in the Nearest NMFS 10-minute Grid Square

Species	Eggs	Larvae	Juveniles	Adults
red hake *(Urophycis chuss)*		X	X	X
redfish *(Sebastes fasciatus)*	n/a			
winter flounder *(Pseudopleuronectes americanus)*	X	X	X	X
windowpane flounder *(Scophthalmus aquosus)*	X	X	X	X
Atlantic sea herring *(Clupea harengus)*		X	X	X
bluefish *(Pomatomus saltatrix)*			X	X
long finned squid *(Loligo pealeii)*	n/a	n/a		
short finned squid *(Illex illecebrosus)*	n/a	n/a		
Atlantic butterfish *(Peprilus triacanthus)*		X	X	X
Atlantic mackerel *(Scomber scombrus)*			X	X
summer flounder *(Paralichthys dentatus)*		X	X	X
scup *(Stenotomus chrysops)*	X	X	X	X
black sea bass *(Centropristis striata)*	n/a		X	X
surf clam *(Spisula solidissima)*	n/a	n/a		
ocean quahog *(Artica islandica)*	n/a	n/a		
spiny dogfish *(Squalus acanthias)*	n/a	n/a		
king mackerel *(Scomberomorus cavalla)*	X	X	X	X
Spanish mackerel *(Scomberomorus maculatus)*	X	X	X	X
cobia *(Rachycentron canadum)*	X	X	X	X
sandbar shark *(Carcharhinus plumbeus)*		X		X
winter skate (*Leucoraja ocellata*)			X	X
little skate (*Leucoraja erinacea*)			X	X
clearnose skate (*Raja eglanteria*)			X	X

3.5 (5) Determination of credits. A description of the number of credits to be provided, including a brief explanation of the rationale for this determination.

3.5.1 Credit Generation

Credit generation is based on the value of the site in its current baseline condition, the mitigation design, the ecological uplift from existing baseline conditions and regulatory definitions of mitigation. Credit ratio is determined with the IRT who often base this on ecological factors as

well as policy and regulatory dictates and precedent established at other mitigation banks and sites in the state.

Credit generation is also predicated on the functional value assessment of the mitigation design as presented in Attachment B - Functional Value Assessment. The following section presents a description of each mitigation category ratio and a brief explanation of the rationale for this determination. The complete assessment of credit ratios entails a review of baseline conditions, the mitigation design plan, an assessment of future habitat conditions and functional uplift, the functional value of these future conditions within the bank site as well as the functional value in the overall landscape position and watershed within which the mitigation bank credits were developed.

Credit ratios are based on a functional value assessment of a wetland that will be restored from Phragmites-dominated degraded tidal wetland to a regraded Spartina-dominated wetland. Mitigation value is to be based on functional uplift, however, a numerical value must eventually be assigned. The functional value assessment was correlated with acres of wetlands to be enhanced and preserved. Practical application in New Jersey recognizes various acre-related valuations, most often represented as ratios, to be dictated by regulation or precedent. Taking into consideration the functional value assessment and ecological uplift, regulatory ratios, and credit ratios for similar wetland mitigation efforts, a 3:1 ratio for enhancement and 27:1 ratio for preservation have been applied. These credit ratios have been generally accepted on similar projects in the past.

- **Enhancement 3:1**

Areas of invasive species and reduced tidal exchange will be enhanced through native plant establishment and earthwork. The design will include areas of higher elevation marsh to increase habitat diversity and reduce re-contamination potential. Per the 2008 Federal Rules: *Enhancement means the manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s), but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.*

- **Preservation 27:1**

Several areas of the site are to remain and will serve as protected buffer. These extant habitats will be protected under a conservation deed restriction in perpetuity. These preservation areas are valuable in and of themselves, but could be subject to development threat were the private owner to propose a development along the Route 35 road frontage. Both the NJDEP and federal policy and rules recognize the mitigation value of preservation. The preservation proposed on-site meets all of the requirements as stated in the federal rules as follows:

§ 332.3 General compensatory mitigation requirements.

(h) Preservation.

(1) Preservation may be used to provide compensatory mitigation for activities authorized by DA permits when all the following criteria are met:

(i) The resources to be preserved provide important physical, chemical, or biological functions for the watershed;
(ii) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available;
(iii) Preservation is determined by the district engineer to be appropriate and practicable;
(iv) The resources are under threat of destruction or adverse modifications; and
(v) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).
(2) Where preservation is used to provide compensatory mitigation, to the extent appropriate and practicable the preservation shall be done in conjunction with aquatic resource restoration, establishment, and/or enhancement activities. This requirement may be waived by the district engineer where preservation has been identified as a high priority using a watershed approach described in paragraph (c) of this section, but compensation ratios shall be higher.

3.5.2 Credit Release Schedule

Subject to review and approval by the Corps and NJDEP in consultation with the IRT, credits from the bank will be released for use according to the following schedule:

1. Ten (10) percent of the credits shall be released upon completion of both of the following:
i. Signing of the Mitigation Banking Instrument; and
ii. Compliance with all pre-release credit sale conditions in the MBI approving the bank, such as securing all permits, posting adequate and effective financial assurance, and completing the conservation restriction;

2. Up to twenty (20) percent of the credits shall be released upon successful establishment of the approved hydrologic regime, so that this regime will remain over time under normal hydrologic conditions;

3. Up to ten (10) percent of the credits shall be released upon completion of planting as required in the Mitigation Banking Instrument (MBI) approving the bank;

4. Up to twenty (20) percent of the credits shall be released when monitoring indicates that the performance standards in the MBI approving the bank have been met for one year;

5. Up to ten (10) percent of the credits shall be released when monitoring indicates that the performance standards in the MBI approving the bank have been met for two years; and

6. Up to ten (10) percent of the credits shall be released when monitoring indicates that the performance standards in the MBI approving the bank have been met for three years; and

7. Up to ten (10) percent of the credits shall be released when monitoring indicates that the performance standards in the MBI approving the bank have been met for four years; and

8. Up to ten (10) percent of the credits shall be released when monitoring indicates that the performance standards in the MBI approving the bank have been met for five years.

3.6 (6) Mitigation work plan and Bank Service Area. Detailed written specifications and work descriptions for the compensatory mitigation project.

The bank mitigation plan focuses on the enhancement of tidal hydrology, removal of sediment, and native tidal marsh vegetation. Target vegetative communities include brackish marsh species such as Smooth cordgrass (*Spartina alterniflora*).

All areas of *Phragmites australis* will be treated with herbicide and excavated to lower the elevation to within the low to mean spring high water mark tidal range. The excavated material would be reused in upland areas or transported off site. These areas would be converted to emergent marsh of native species such as S. alterniflora, Saltmeadow cordgrass (*S. patens*), spike grass (*Distichlis spicata*) and saltmeadow rush (*Juncus gerardii*). Mudflat and open water habitats would also be enhanced.

The acreage of existing wetland and upland habitats that could be restored is estimated in Table 2.

- **Service Area**

As described in Section 2.0, the proposed service area is depicted on Attachment A, Figure 3. Located in HUC-11 020-30-104-060, the bank site is within the HUC-8 020-30-104 of the Raritan Bay drainage. The service area includes HUC-11 hydrologic unit code watershed numbers as follows:

020-30-104-010
020-30-104-020
020-30-104-030
020-30-104-050
020-30-104-060 (Bank Location)
020-30-104-070
020-30-104-080
020-30-104-090
020-30-104-100
020-30-104-910
020-30-104-920
020-30-104-930
020-30-105-120
020-30-105-160

In the service area, the mitigation credits from the bank will be used to mitigate for impacts to estuarine and palustrine emergent, mudflat, scrub/shrub and open water wetlands and waters of the U.S. Only the mitigation credits from the forest preservation will be used to mitigate for impacts to palustrine forested wetlands.

Pursuant to the federal rules, the Whale Creek service area is predicated on a watershed approach to delineate the limits of the service area. Ecologically, the tidal waters of the Whale

Creek vicinity are all interconnected and, as such, the region is often addressed and referred to as the Hudson Raritan Estuary (HRE) and Atlantic Coast Water Region. The region is the subject of many studies specifically related to ecosystem interrelatedness and restoration (New York Corps HRE, 2017). Ecologically, these waters flow upstream and downstream supporting aquatic biota ranging in and throughout the region as seasonal or permanent residents. As a tidal mitigation bank, subjected to the ebb and flow of waters bi-directionally both downstream as well as upstream, the Whale Creek site is interconnected to the greater watershed by geography as well as water interchange and interaction in a manner far greater than a palustrine mitigation site where water flow is unidirectional.

However, in practice, the recognition of a watershed-based or ecologically-based service area is constrained by political boundaries. The Whale Creek Mitigation Bank is located in the **Sandy Hook-Staten Island Watershed – 020-30-104 (EPA).** The HUC-8 watershed 020-30-104 drains to the Raritan Bay (deepwater) and Atlantic Ocean as per the NJ Geological Survey. The watershed includes Staten Island, New York. The use of the HUC-8 watershed as the service area is consistent with the Federal Rules, Final Rule (40 CFR Subpart J, Section 230.98 (d)(6)(ii)), excerpted in part below:

"*The service area must be appropriately sized to ensure that the aquatic resources provided will effectively compensate for adverse environmental impacts across the entire service area. For example, in urban areas, a U.S. Geological Survey 8-digit hydrologic unit code (HUC) watershed or a smaller watershed may be an appropriate service area. In rural areas, several contiguous 8-digit HUCs or a 6-digit HUC watershed may be an appropriate service area. Delineation of the service area must also consider any locally-developed standards and criteria that may be applicable. The economic viability of the mitigation bank or in-lieu fee program may also be considered in determining the size of the service area.*"

However, the Sponsor is not requesting the service area include Staten Island, New York State even though this HUC-8 watershed unit encompasses portions of New Jersey as well as New York states.

There are no federal mitigation banks in the vicinity and there are none planned. The HUC-8 020-30-104 forms the border with the Philadelphia District. Several yet-to-be-approved mitigation banks have been proposed south of HUC 020-30-104, but all have been denied service areas that extend north and into HUC 020-30-104 of the New York District. As a result, the southern HUC-11's are proposed to serve orphaned and underserved subwatersheds at the interface between the New York and Philadelphia Districts.

Other federal, tidal marsh mitigation banks include Stipson's Island, Port Reading, MRI3 and Abbot Creek. All of these mitigation banks encompass estuarine service areas composed of HUC-8s augmented by HUC-11 unit codes to reflect the regional estuarine watershed.

An unfortunate but ecologically constraining reality of wetland mitigation in the tidal zones of northern New Jersey are historical industrial land use, heavy development pressure, and contamination levels limiting mitigation opportunities for permitted actions. As a result, areas of Newark Bay, Arthur Kill, lower Raritan River, Raritan Bay are all in need of mitigation options but possess limited mitigation areas, if any, that are viable. Beyond the interconnectedness of the estuary, the Whale Creek mitigation site could serve to provide mitigation options for

developments in industrial and contaminated subwatersheds. In reality, such impacts are often fractional components of acres and mitigation is unfeasible and undesirable in the form of onsite, postage stamp-sized mitigation sites as compared to mitigation concentrated in a larger contiguous protected mitigation site or bank such as Whale Creek. Ecologically, such mitigation has a much higher potential to be successful and replace ecological functions, values and services lost in the watershed from fractional acre impacts scattered throughout the watershed.

The federal rules detail the approach to service area designation for both mitigation banks and in lieu fee programs (Federal Rules 2008 § 332.8 Mitigation banks and in-lieu fee programs) as follows:

All mitigation banks and in-lieu fee programs must comply with the standards in this part, if they are to be used to provide compensatory mitigation for activities authorized by DA permits, regardless of whether they are sited on public or private lands and whether the sponsor is a governmental or private entity.

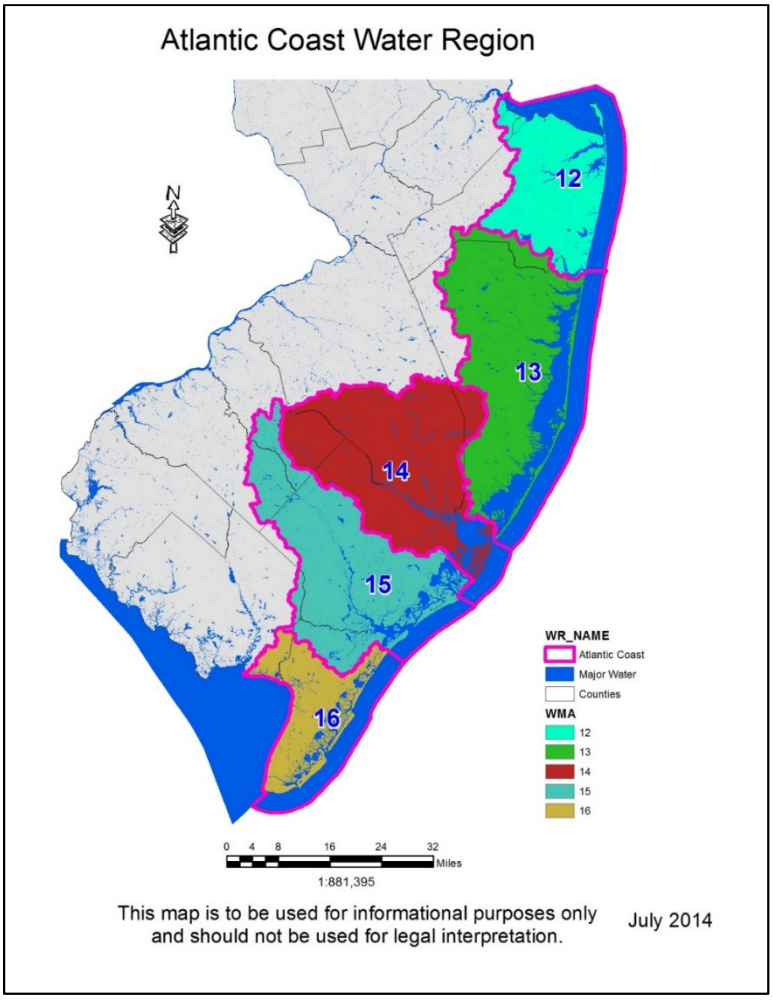
(c) Compensation planning framework for in-lieu fee programs.
(1) The approved instrument for an in-lieu fee program must include a compensation planning framework that will be used to select, secure, and implement aquatic resource restoration, establishment, enhancement, and/or preservation activities. The compensation planning framework must support a watershed approach to compensatory mitigation. All specific projects used to provide compensation for DA permits must be consistent with the approved compensation planning framework. Modifications to the framework must be approved as a significant modification to the instrument by the district engineer, after consultation with the IRT.
(2) The compensation planning framework must contain the following elements:
(i) The geographic service area(s), including a watershed-based rationale for the delineation of each service area

One of the best watershed-based and ecologically-based arguments put forth describing and supporting the Whale Creek service area is that put forth by NJDEP for the state's mitigation bank; NJDEP COMPENSATION PLANNING FRAMEWORK FOR NEW JERSEY'S ILF PROGRAM (2014). The Planning Framework was prepared consistent with the federal rules, as detailed above, as state assumption of the 404 program is overseen by EPA who approved this framework. The framework is part of the in lieu fee (ILF) MBI and details and substantiates the state wetland bank's service area. In this framework, the state of New Jersey describes the Whale Creek service area as the "Atlantic Coast Water Region" encompassing five (5) WMAs in an area significantly larger than the service area proposed by the Sponsor. However, the water and eco-region based framework rationale is applicable to the designation of the service area limits for a mitigation bank located in the Whale Creek area as excerpted:

Atlantic Coast Water Region: Watershed Management Areas 12, 13, 14, 15, 16

The Atlantic Coast Water Region consists of the sub watersheds with drainage areas that flow to the Atlantic Ocean. The Water Region encompasses the Barnegat Bay, portions of the Pinelands, many large state forests and parks, as well as the highly developed Jersey shore. The Water Region has encountered new residential and commercial development at a faster

rate than the rest of the State and some areas face the threat of salt water intrusion. Almost all of Monmouth, Ocean, Atlantic and Cape May counties are encompassed within this Water Region, and half of Burlington County and small sections of eastern Middlesex, Gloucester and Camden counties.



In conclusion the service area for the Whale Creek Mitigation Bank is supported based on:

- A watershed based approach taking in to consideration the interconnectedness of this unique tidal estuary.

- The use of the HUC watershed designations, specifically the HUC-8, 020-30-104, excluding New York State.

- HUC-11 subwatersheds of the lower, tidal Raritan River are directly connected to Raritan Bay.

- HUC-11s at the southern end of HCU 020-30-104 abut the Philadelphia District and exclusion would leave them orphaned and unserved by any mitigation banks.

- Urban Estuary mitigation needs in the contaminated tidal waters of northern New Jersey specifically Raritan Bay, lower Raritan River, Arthur Kill and lower Newark Bay

- Documentation presented in the Corps' HRE Restoration Study and the New Jersey Watershed Planning Framework for the State's ILF Mitigation Bank.

3.7 (7) Maintenance plan. A description and schedule of maintenance requirements to ensure the continued viability of the resource once initial construction is completed.

The mitigation bank would be monitored for a five year performance period. If performance issues are encountered, maintenance actions will be implemented. Maintenance would include the planting of species to replace those lost as a result of mortality greater than 15 percent. Additionally, invasive species such as Phragmites will be monitored and treated annually to ensure levels are below 10 percent.

Maintenance access will occur by foot or through the use of kayaks in the future. In the event that earthwork must be conducted, construction equipment access would be by low ground pressure equipment supported by movable individual mats.

The primary focus of the maintenance plan will be to initiate management and remedial actions necessary to achieve specified performance standards. Maintenance efforts will be designed to ensure establishment of the target vegetation types, the prevention of Phragmites encroachment within the tidal emergent wetland zone, and curtailment of herbivory until the time that dense vegetative cover has become established. Maintenance tasks detailed below will be undertaken as directed by the results of the monitoring program.

3.7.1 *Phragmites australis* Control

During the monitoring and maintenance period, the applicant will conduct a *P. australis* control program as deemed necessary by monitoring data. This program will consist of herbicide spot treatment applications of *P. australis* plants within affected areas of the wetland. If *P. australis* exceeds 5 percent of the vegetative cover, the applicant will initiate control measures.

3.8 (8) Performance standards. Ecologically-based standards that will be used to determine whether the compensatory mitigation project is achieving its objectives.

The bank performance standards will be similar to other mitigation sites and banks of the tidal zone of New Jersey. Tidal hydrology will be monitored via observations of the daily tides. Plant survival and coverage will be monitored to achieve 85 percent cover by Year 5 with lower percent cover targets in Year 2 increasing from 65 percent to 85 percent in Years 3 through 5. Invasives will be kept below 10 percent at all times.

All monitoring and maintenance conducted for the Bank will be performed in accordance with the MBI and Federal and State permit standards. The goal of the monitoring and maintenance program will be to accurately determine the mitigation bank's success relative to performance standards and goals developed and to identify any problems requiring remedial action.

The success of the mitigation bank will be measured by performance standards. Post-construction monitoring and maintenance of the mitigation bank will be performed for three to five consecutive years, beginning with the first full growing season following completion of construction of the mitigation bank. The growing season is defined to begin June 1. If all plants are installed by June 1, that year will be considered Year 1 in the Bank's monitoring period subject to fall monitoring results demonstrating achievement of required success criteria of survival and coverage.

The mitigation bank will be designed and implemented to meet performance standards that will serve as success criteria. Monitoring will measure the performance of the mitigation bank and results will be compared to performance standards. If the mitigation bank meets performance standards, success will be achieved. If the mitigation bank does not meet performance standards, corrective actions will be implemented to achieve success. Performance will be measured annually and successful achievement of performance standards will be assessed annually. If all milestone task success criteria and performance standards are achieved, the Corps and NJDEP in consultation with the IRT will release all eligible credits in accordance with the credit release schedule.

The Corps and NJDEP, in consultation with the IRT, will confirm within 60 days whether or not the tasks are successfully completed for purposes of releasing credits.

Performance Standards by designed habitat zone are described below:

3.8.1 Emergent Marsh

- Establish Hydrologic Regime

Demonstrate the grading has been implemented as per the approved design plans and the emergent marsh is saturated or inundated by the daily tides.

- Completion of Planting

Demonstrate the planting has been completed as per the approved design plans.

- Hydrologic Performance Standard

Years 1 through 3 to 5; demonstrate daily tidal saturation or inundation.

- Vegetative Performance Standard

Years 1 through 3 to 5; demonstrate 85 percent survival of target planting density. Years 1 and 2; demonstrate 65 percent vegetative cover. Years 3 and 4 demonstrate 75 percent vegetative

cover. Year 5 demonstrate 85 percent vegetative cover. Years 1 through 3 to 5; demonstrate invasive cover is less than 10 percent.

Basis:

Vegetative survival of plantings will be based on the target planting density of 4,840 herbaceous plants per acre. Invasive cover will not exceed 10 percent; management efforts will be implemented should invasives exceed a 5 percent threshold. Invasive species include species such as but not limited to *Phalaris arundinacea* (Reed canary grass), *Phragmites australis* (Common reed grass), *Pueraria lobata* (Kudzu), *Lythrum salicaria* (Purple loosestrife), *Ailanthus altissima* (Tree-of-heaven), *Berberis thunbergii* (Japanese barberry), *Berberis vulgaris* (Common barberry), *Elaeagnus angustifolia* (Russian olive), *Elaeagnus umbellata* (Autumn olive), *Ligustrum obtusifolium* (Japanese privet), *Ligustrum vulgare* (Common privet) and *Rosa multiflora* (Multiflora rose).

3.8.2 Open Water and Mudflat

- Establish Hydrologic Regime

Demonstrate the grading has been implemented as per the approved design plans and the intertidal and open water area is saturated or inundated by the daily tides.

- Hydrologic Performance Standard

Years 1 through 3 to 5; demonstrate daily tidal saturation or inundation.

- Vegetative Performance Standard

Years 1 through 3 to 5; demonstrate invasive cover is less than 10 percent.

Basis:

The intertidal open water and mudflat habitat zone will not be planted or seeded, but may and are expected to be colonized by native species over time depending on accretion rates. Invasive cover will not exceed 10 percent; management efforts will be implemented should invasives exceed a 5 percent threshold. Invasive species include species such as but not limited to *Phalaris arundinacea* (Reed canary grass), *Phragmites australis* (Common reed grass), *Pueraria lobata* (Kudzu), *Lythrum salicaria* (Purple loosestrife), *Ailanthus altissima* (Tree-of-heaven), *Berberis thunbergii* (Japanese barberry), *Berberis vulgaris* (Common barberry), *Elaeagnus angustifolia* (Russian olive), *Elaeagnus umbellata* (Autumn olive), *Ligustrum obtusifolium* (Japanese privet), *Ligustrum vulgare* (Common privet) and *Rosa multiflora* (Multiflora rose).

3.9 (9) Monitoring requirements. A description of parameters to be monitored in order to determine if the compensatory mitigation project is on track to meet performance standards.

The following monitoring and maintenance plan establishes guidelines to measure success of the mitigation bank relative to performance standards. The plan also includes monitoring and

maintenance requirements to uncover and correct deficiencies. Access to the mitigation bank site will be conducted by foot and through the use of kayaks as necessary in the future. Monitoring will address wetland plant communities by zone as well as hydrology of the wetland community. Herbaceous cover will be monitored to determine coverage and survival. Hydrology of the tidal marsh will be monitored via daily observations and time lapse photography. Invasive species will be monitored based on percent cover.

Monitoring will be conducted until such time that the Corps and NJDEP are confident that success is being achieved (i.e., performance standards are attained). The period for monitoring is three to five years; however, it may be necessary to extend this period if the mitigation bank does not achieve performance standards within that time period.

As-built drawings of the wetland construction activities and a post-construction report will be submitted to the Corps and NJDEP within 60 days from the date of the completion of construction and planting. The as-built drawings shall include all aspects of the final grading elevations and planting arrangements of the wetland mitigation bank. Annual reports will be submitted to the Corps and NJDEP no later than December 31 of each year, for three to five years following the first full growing season after completion of construction of the wetland mitigation and/or initiation of the wetland planting activities.

In accordance with anticipated permit requirements, annual reports will include:

1. A bank plan showing the grading, hydrologic and planting changes, if any, made during the year that is the subject of the report.

2. A detailed narrative summarizing the condition of the mitigation bank and all regular maintenance activities;

3. Identification of plant species, along with their estimated relative percent cover, along transects using plots measuring one meter square with at least one representative transect located in each habitat ecotone within the bank.

4. Photographs showing all representative areas of the bank taken at least once each year during the period between June 1 and November 1.

3.9.1 Monitoring Of Vegetation Establishment

3.9.1.1 Emergent Marsh

Standard statistical methods will be employed to monitor the development of vegetative cover and dominance patterns within the emergent marsh portions of the bank. The vegetation sampling program will be conducted once yearly in summer or early fall throughout the monitoring period. Permanent transects will be established within the emergent wetland and the end-points of each transect permanently marked with four-inch capped PVC pipes or equivalent. One-meter square quadrats will be established at evenly spaced intervals along each transect. The number of quadrats along each transect will vary depending on transect length.
For each quadrat, a visual estimate of the total percent ground cover of live vegetation will be made, as well as a visual estimate of the ground cover by individual species. Using these data, the following statistics will be generated: the total percent ground cover of live vegetation and

percent cover by individual species for each transect, the total percent ground cover of emergent vegetation by transect, and the mean total percent ground cover of emergent vegetation for all transects. All data sheets will be included in the annual monitoring reports as an appendix.

3.9.1.2 Vegetation Mapping

Within the first annual report, an "as-built" drawing will be included that depicts final grading elevations and planting arrangements of the wetland mitigation bank.

3.9.1.3 Bank Photographs

A series of representative photographs showing all vegetation zones will be included in each monitoring report. These photographs will show vegetation development on a broad-scale and close-ups of plant growth patterns.

3.9.2 Monitoring Of Hydrology Establishment

3.9.2.1 Emergent Marsh

Field observations and photographic documentation on the establishment of tidal flow, including vegetative response to hydrology, will be made during the monitoring period. During the first year monitoring period, time-lapse photographs will be taken of the movement of the tide through channels and across the marsh plain throughout one complete tidal cycle to illustrate that tidewaters flood and ebb on a typical day. Additionally, field observations will be augmented by the placement of a calibrated tidal staff gage at a representative location within the emergent marsh portion of the mitigation bank to monitor tidal inundation and tide height. Observations of erosion will be made, if any.

3.9.2.2 Open Water Mudflat

This area will consist of tidal channels and associated mudflat. These areas will not be planted, but may and are expected to be colonized by native species over time depending on accretion rates. Field observations and photographic documentation on the establishment of tidal flow, including vegetative response to hydrology, will be made during the monitoring period. During the first year monitoring period, time-lapse photographs will be taken of the movement of the tide through channels and across the marsh plain throughout one complete tidal cycle to illustrate that tidewaters flood and ebb on a typical day. Additionally, field observations will be augmented by the placement of a calibrated tidal staff gage at a representative location within the open water mudflat portion of the mitigation bank to monitor tidal inundation and tide height. Observations of erosion will be made, if any.

3.9.3 Conclusions and Recommendations

Each annual monitoring report will include a conclusions and recommendations section consisting of professional observations. General observations of wildlife utilization of the mitigation bank will be made, as well as observations of herbivory pressures and any

encroachment of *Phragmites australis*. Statistical data developed from monitoring activities will be evaluated and discussed relative to anticipated performance standards. Recommendations for maintenance and corrective measures relative to anticipated performance standards will be included in this section of each annual monitoring report.

3.10 (10) Long-term management plan. A description of how the compensatory mitigation project will be managed after performance standards have been achieved to ensure the long-term sustainability of the resource.

After the initial three to five year monitoring period beginning upon completion of construction and planting, the Sponsor shall continue to provide annual monitoring reports to the Corps and NJDEP on the long term success of the Bank and to identify any problems requiring remedial action. Any such remedial action shall be taken in accordance with the Banking Instrument. The Bank will be protected in perpetuity by recording a Conservation Deed Restriction / Easement on the property.

Long term monitoring refers to the time period subsequent to mitigation bank performance attainment of milestones and commensurate credit release. Long term monitoring begins subsequent to the bank achieving all milestones and the IRT approving the release of all bank credits. At this juncture of the mitigation bank, the sponsor will continue monitoring until all credits are sold or for a total of ten years, whichever comes last. Under the anticipated schedule the long term monitoring will begin in Year 6, after the bank has met all performance standards and all credits have been released in Year 5. At the time of commencement of long-term monitoring the bank will have met all success criteria and a wetland delineation of the bank site will have been conducted to confirm the jurisdictional limits of wetlands within the bank. As a result, the long term monitoring data provided will be used to ensure that the bank continues to meet the achieved performance standards. The monitoring program will be less rigorous than the milestone monitoring program of the first five years, but serve to provide the IRT a concise assessment of bank status and condition.

Annual reports will be submitted to the Corps and NJDEP no later than December 31 of each year, until either all credits are sold or until the tenth year following construction and planting, whichever comes last.

3.10.1 Long-term Monitoring of Vegetation and Hydrology

3.10.1.1 Estuarine Emergent Wetland

Standard statistical methods will be employed to monitor the development of vegetative cover and dominance patterns within the estuarine emergent marsh/tidal marsh portions of the Bank site. The vegetation sampling program will be conducted once yearly in summer or early fall throughout the monitoring period. Permanent transects will be established within the emergent marsh and the end-points of each transect permanently marked with four-inch capped PVC pipes or equivalent. One-meter square quadrats will be established at evenly spaced intervals along each transect. The number of quadrats along each transect will vary depending on transect length.

For each quadrat, a visual estimate of the total percent ground cover of live vegetation will be made. Using these data, the following statistics will be generated: the total percent ground cover of live vegetation, the total percent ground cover of emergent vegetation by transect, and the mean total percent ground cover of emergent vegetation for all transects. All data sheets will be included in the annual monitoring reports as an appendix. The presence of hydrophytic vegetation will be used to assess the presence and maintenance of wetland tidal hydrology.

3.10.1.2 Site Photographs

A series of representative photographs showing all vegetation zones will be included in each monitoring report. These photographs will show vegetation development on a broad-scale and close-ups of plant growth patterns.

3.10.2 Conclusions and Recommendations

Each long term monitoring report will include a conclusions and recommendations section consisting of professional observations. General observations of wildlife utilization of the bank will be made, as well as observations on herbivory pressures and any encroachment of invasive species. Statistical data developed from monitoring activities will be evaluated and discussed relative to achieved milestones. Recommendations for maintenance and corrective measures relative to achieved milestones will be included in this section of each monitoring report.

3.10.3 Long Term Maintenance Plan

During the long term monitoring period, the Sponsor shall also be responsible for long term maintenance. The primary focus of the long-term maintenance plan will be to initiate management and remedial actions necessary to maintain the bank at the level of achieved milestones as specified in the performance standards. Maintenance efforts will be designed to ensure maintenance of the target vegetation types, the prevention of invasive species encroachment within the tidal marsh zone, and curtailment of herbivory. Maintenance tasks detailed below will be undertaken as directed by the results of the long term monitoring program.

3.10.4 Invasive Species Control

During the long term monitoring and maintenance period, the Sponsor will conduct an invasive species control program as deemed necessary by monitoring data. This program will consist of herbicide spot treatment applications of invasive species plants within affected areas of the wetland. If invasive species exceed 5 percent of the vegetative cover, the Sponsor will initiate control measures.

3.10.5 Long Term Stewardship

Long term management will be conducted after the five year monitoring performance period until the bank credits are sold. After the bank is sold out of credits, the bank will be protected under the CDR. The Bank will be transferred to a Land Trust approved by the Corps and NJDEP with a maintenance fund. The maintenance fund will comply with NJDEP policy which states, “Provide the government agency or charitable conservancy with a maintenance fund for

maintenance and supervision of the mitigation area. The amount of the maintenance fund shall be determined by agreement between the mitigator and the agency or conservancy."

3.11 (11) Adaptive management plan. A management strategy to address unforeseen changes in site conditions or other components of the compensatory mitigation project.

The bank will be monitored annually. Evergreen will work with the IRT to make field adjustments and decisions based on interim observations. Some adaptive management initiatives may include mid-season re-planting, treatment of *Phragmites* or seeding of an unstable slope. Adaptive management will be conducted in consultation with the IRT to make field adjustments based on site microtopography or specific issues.

3.12 (12) Financial assurances. A description of financial assurances that will be provided.

The Sponsor agrees to provide the following financial assurances for the work described herein. The Sponsor will secure sufficient funds and financial assurances, as described below, to cover contingency actions in the event that the Sponsor fails to comply with the terms or to rectify any unforeseen events as determined by the Corps and NJDEP. In addition, the Sponsor shall also be responsible for providing adequate funding to monitor and maintain the Bank until either all Bank credits have been sold and applied to a permitted project or for a total of 10 years after the date of completion of construction and initial planting, whichever comes last.

Performance Surety: Prior to the release of any credits by the Corps and NJDEP, the Sponsor must obtain a bond or financial surety that is acceptable to the Corps and NJDEP and names the NJDEP as the obligee. The financial assurances for the construction of the mitigation project will be a Performance Surety bond and/or letter of credit posted in an amount equal to 115 percent of the estimated cost of construction. A Performance Surety bond posted by the construction subcontractor, naming the Sponsor and NJDEP as obligees may be used to satisfy all or part of this requirement.

Maintenance Surety: Prior to the release of any credits by the Corps and NJDEP, the Sponsor must obtain a bond or financial assurance that is acceptable to the Corps and NJDEP and names the NJDEP as the obligee. The financial assurances for the monitoring and maintenance costs of the Mitigation Bank will be a Maintenance Surety bond or casualty insurance policy to assure the success of the mitigation through the completion of the monitoring period, equal to 115 percent of the estimated cost of monitoring and maintaining the site, including the cost to replant the mitigation area.

Surety Release: Upon receipt of the as-built and planted report and subject to site inspection and approval, Corps and NJDEP will authorize the Sponsor to retire the Performance Surety. Upon receipt of each written annual monitoring report, showing that the project is meeting yearly performance requirements, subject to site inspection and approval, the Corps and NJDEP will annually authorize the Sponsor to reduce the balance of the Maintenance Surety by 20% of the original total.

4.0 Conclusion

Evergreen proposes to develop the Evergreen Whale Creek Mitigation Bank. The mitigation bank is proposed in accordance with the Federal Rules; "Compensatory Mitigation for Losses of Aquatic Resources"; Final Rule (33 CFR Parts 325 and 332 and 40 CFR Part 230) of April 10, 2008. This mitigation bank will provide mitigation for impacts to aquatic resources including impacts to wetlands.

The mitigation bank will be developed in accordance with the following state authorities and implemented to provide aquatic resource mitigation including mitigation for regulated impacts to waters of the U.S., and wetlands as regulated by the state.

- New Jersey Waterfront Development Law (N.J.S.A. 12:5-1 et seq.)
- New Jersey Freshwater Wetlands Protection Act of 1987 (N.J.S.A. 13-9B-1 et seq.)
- Rules on Coastal Zone Management (N.J.A.C. 7:7 et seq.)

Once implemented, the bank will be a combination of emergent marsh, open water and mudflat habitat, generally exposed twice a day during the tidal cycle. The marsh plain will be vegetated with native species and invasive species will be controlled via herbicide treatment and excavation as well as planting of native species to out-compete the invasive species. The design will include areas of higher elevation marsh to increase habitat diversity and reduce re-contamination potential. The tidal inundation of the site will also serve to curtail invasive species through increased hydroperiod and increased salinity levels. Functions anticipated to be restored at the bank site include flood storage, nutrient retention as well as transport and water filtration and, therefore, improved water quality will result from the interaction of the daily tides with the marsh plain vegetated with native species. Wildlife and fish habitat, including habitat for threatened and endangered species, will be enhanced in the aquatic community as well as in the upland habitat community. Social functional benefits will include increased opportunities for scientific education, passive recreation, and aesthetic visual benefits of a restored tidal marsh.

Emergent wetland areas will be planted with tidal marsh herbaceous species such as *Spartina* species.

Some of the excavated material may be re-used off-site at an approved location. Some of the excavated material may be re-used onsite within upland areas. The design plan will enhance the tidal wetland function and value of the site. Increased exposure to tidal flushing will improve the ability of the marsh to ameliorate water quality and make the marsh more available to estuarine aquatic life. The native plants will improve the foraging habitat for shore birds, water fowl and long-legged wading birds.

It is proposed that the credits will be available to be used as mitigation in accordance with applicable requirements. One (1) credit from the Bank would mitigate for one (1) typical acre of authorized wetland impact.

There is a great need for wetland mitigation in the Raritan Bay and Atlantic region. Limited mitigation is available for permitted private sector projects in the region. Currently there are no tidal wetland mitigation banks in the region. The proposed Whale Creek wetland mitigation bank is technically feasible and incorporates design concepts applied successfully to other mitigation sites in the state over the past several decades. The proposed concept involves the removal of tidal restrictions and excavation of fill material so as to establish a tidal regime suitable for native emergent marsh habitat.

Evergreen as Sponsor will secure sufficient funds and financial assurances to cover contingency actions in the event that the Sponsor fails to comply with the terms of the MBI or to rectify any unforeseen events as determined by the IRT. In addition, the Sponsor shall also be responsible for providing adequate funding to monitor and maintain the Bank until either all Bank credits have been sold and applied to a permitted project or for a total of 10 years after the date of completion of construction and initial planting, whichever comes last.

Long term management will be conducted after the five year monitoring performance period until the bank credits are sold. After the bank is sold out of credits, the majority of the bank will be maintained under the CDR. The Bank will be transferred to a Land Trust approved by the Corps and NJDEP with a maintenance fund. The maintenance fund will comply with NJDEP policy which states, “Provide the government agency or charitable conservancy with a maintenance fund for maintenance and supervision of the mitigation area. The amount of the maintenance fund shall be determined by agreement between the mitigator and the agency or conservancy.”

Subsequent to the Corps’ prospectus public notice comment period, Evergreen will respond to comments, if any, and prepare a Mitigation Banking Instrument for the implementation and operation of the Evergreen Whale Creek Mitigation Bank.

5.0 References

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Pictures

Photograph 1 – Looking west at *Phragmites* stand from marsh in southern portion of project area

Photograph 2 – Looking west toward NJ State Route 35 from center of emergent marsh at *Spartina alterniflora*

Photograph 3 – Dense *Phragmites* stand on proposed bank site

Photograph 4 – Looking north toward Raritan Bay at emergent marsh *Spartina patens* and *Phragmites* from southern portion of the project site

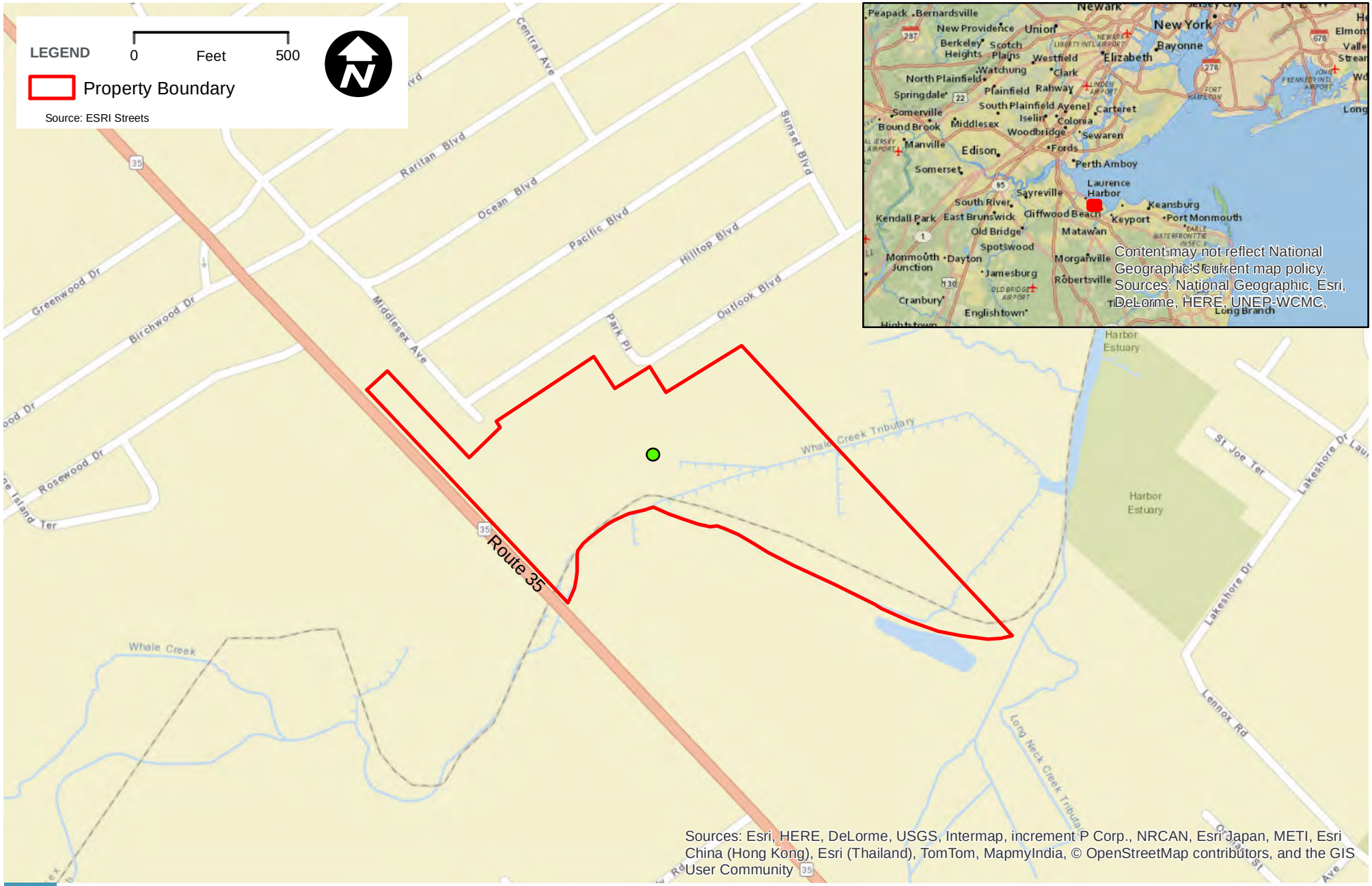
Attachment A

Figures

EVERGREEN WHALE CREEK MITIGATION BANK SITE - OLD BRIDGE, MIDDLESEX COUNTY, NJ

PROSPECTUS

FIGURE 1 USGS KEYPORT QUADRANGLE MAP

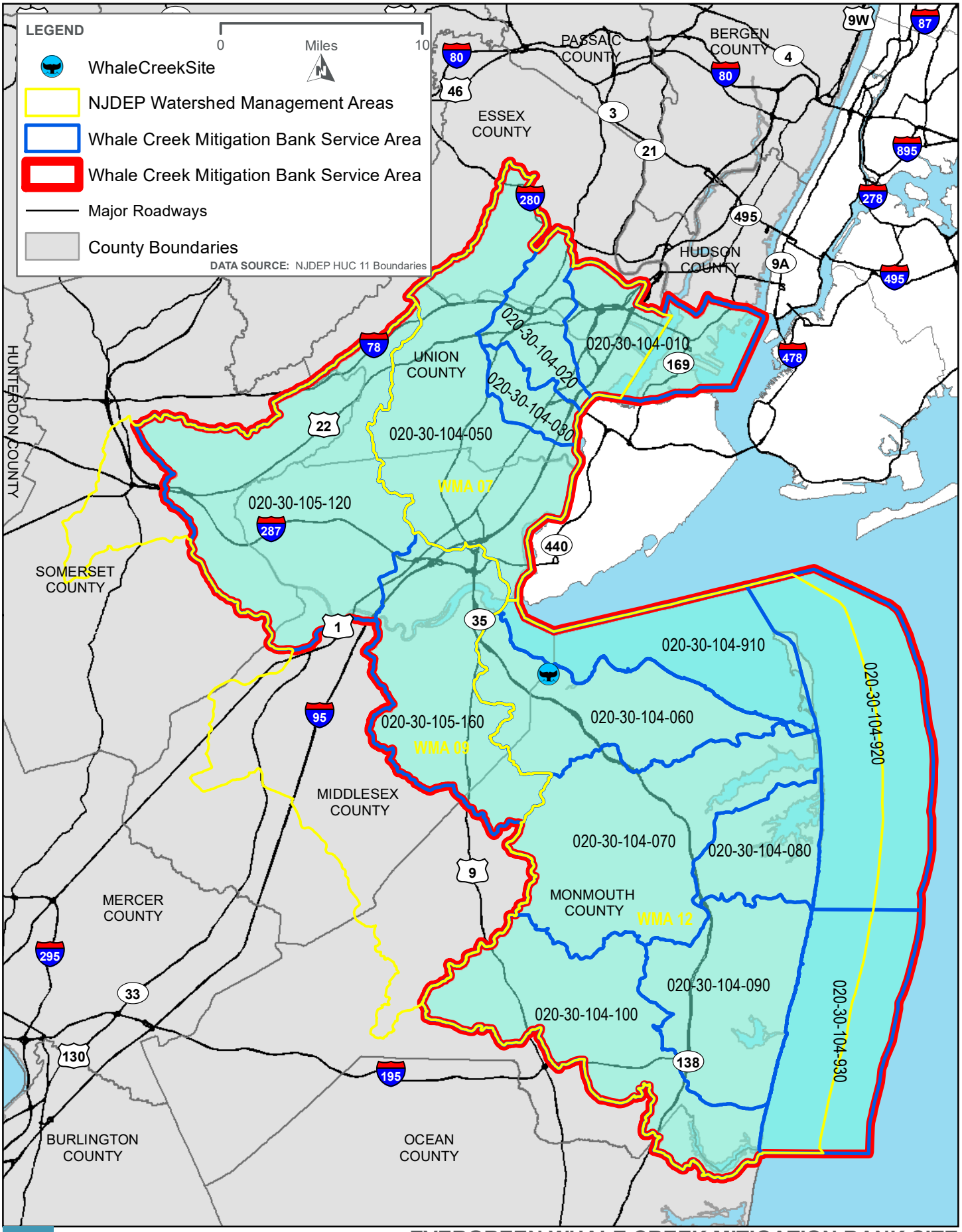


EVERGREEN WHALE CREEK MITIGATION BANK SITE - OLD BRIDGE, MIDDLESEX COUNTY, NJ

PROSPECTUS

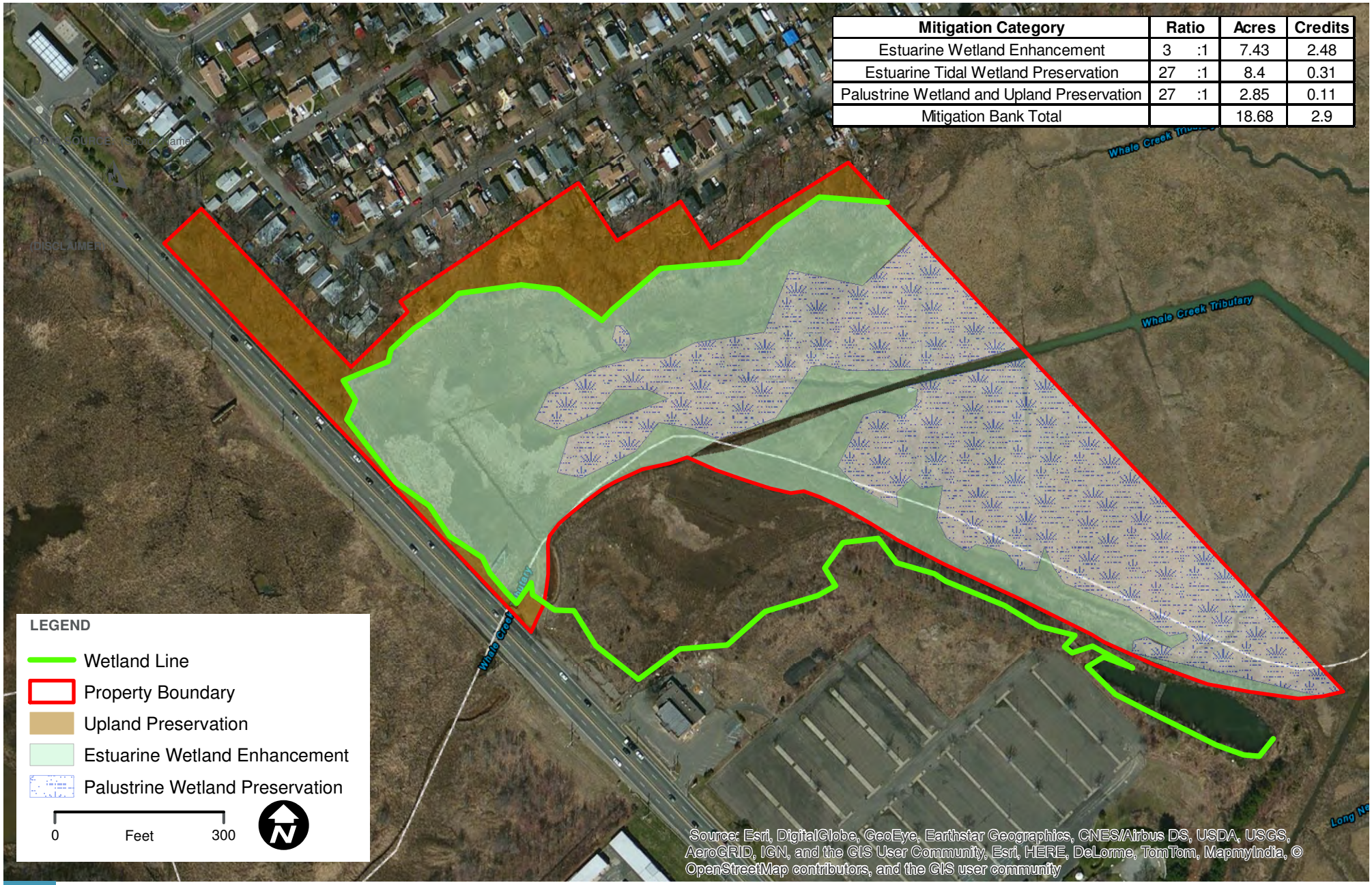
FIGURE 2 LOCAL ROAD MAP

PATH: \\NJ-MAHWAH\ACTIVEPROJECTS\341573\CON0069904\CON0103718\0000000000270542\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\GIS\MAP_DOCS\DRAFT\PERMIT_FIGURES\FIG02_LOCALROADS_8-8-2016.MXD - USER: DBRIZZOL - DATE: 1/26/2017



EVERGREEN WHALE CREEK MITIGATION BANK SITE
OLD BRIDGE, MIDDLESEX COUNTY, NJ
PROSPECTUS
FIGURE 3 SERVICE AREA AND WATERSHEDS MAP

PATH: \\MAHPI-FILE01\GIS_PROJECTS\448177_EVERGREEN ENVIRONMENTAL LLC\10038062_EVERGREEN-DB-WHALE CREEK\GIS\MXD\PROSPECTUS\FIG03_SERVICEAREA_2-15-17.MXD - USER: DBRIZZOL - DATE: 6/29/2017



Mitigation Category	Ratio	Acres	Credits
Estuarine Wetland Enhancement	3 :1	7.43	2.48
Estuarine Tidal Wetland Preservation	27 :1	8.4	0.31
Palustrine Wetland and Upland Preservation	27 :1	2.85	0.11
Mitigation Bank Total		18.68	2.9

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PROSPECTUS

FIGURE 4 CONCEPTUAL MITIGATION DESIGN PLAN

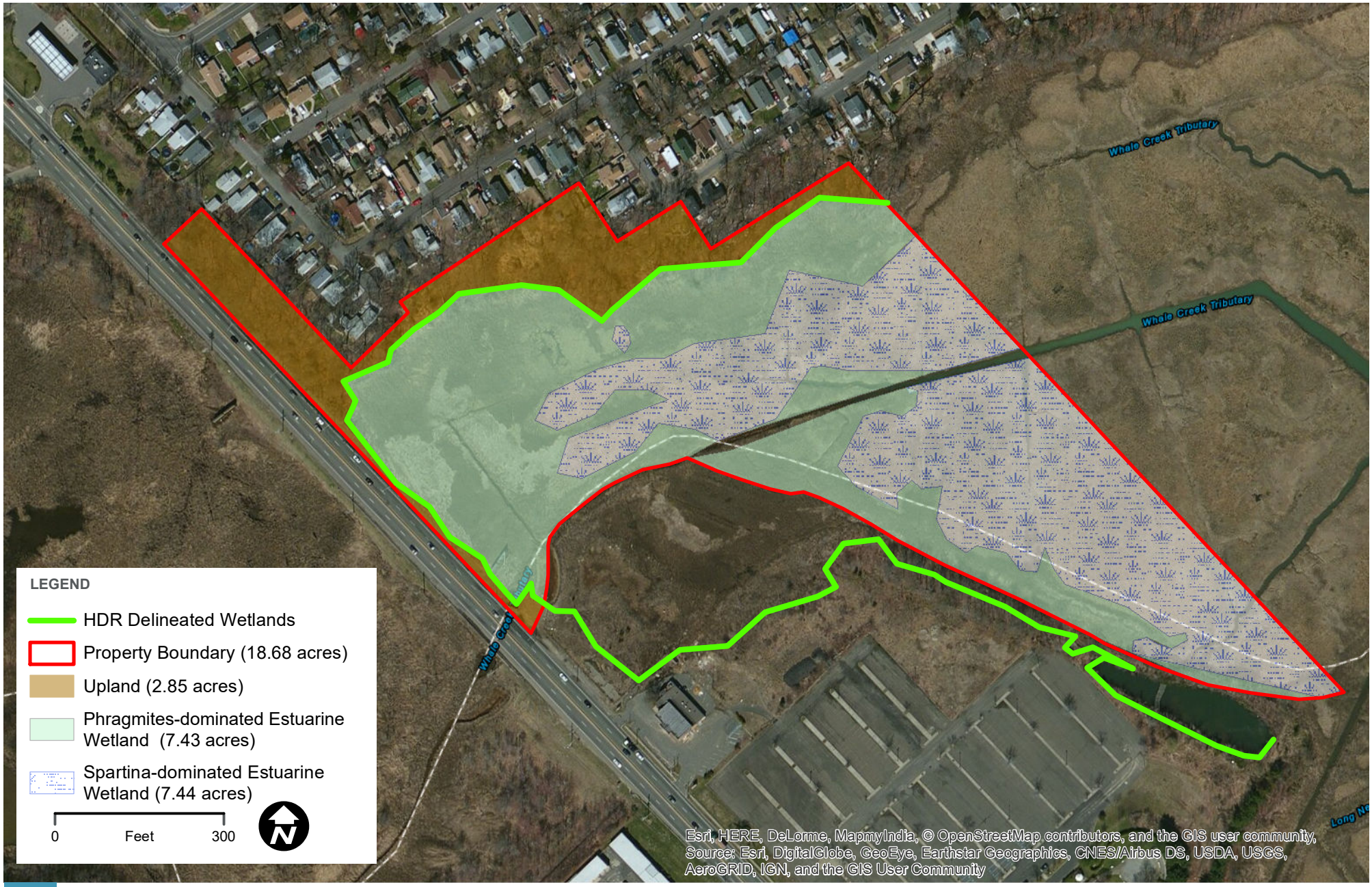
PATH: Z:\448177_EVERGREEN ENVIRONMENTAL LLC\10038062_EVERGREEN-DB-WHALE CREEK\GIS\MXD\PROSPECTUS\FIG05_HABITAT AND WETLAND DELINEATION.MXD - USER: DBRIZZOL - DATE: 2/15/2017

EVERGREEN WHALE CREEK MITIGATION BANK SITE - OLD BRIDGE, MIDDLESEX COUNTY, NJ

PROSPECTUS

FIGURE 5 TAX MAP, OPEN SPACE AND GREEN ACRES PARCELS

PATH: Z:\448177_EVERGREEN ENVIRONMENTAL LLC\10038062_EVERGREEN-DB-WHALE CREEK\GIS\MXD\PROSPECTUS\FIG04_TAX MAPGREENACRESOPENSPACE_01-27-2016.MXD - USER: DBRIZZOL - DATE: 1/27/2017

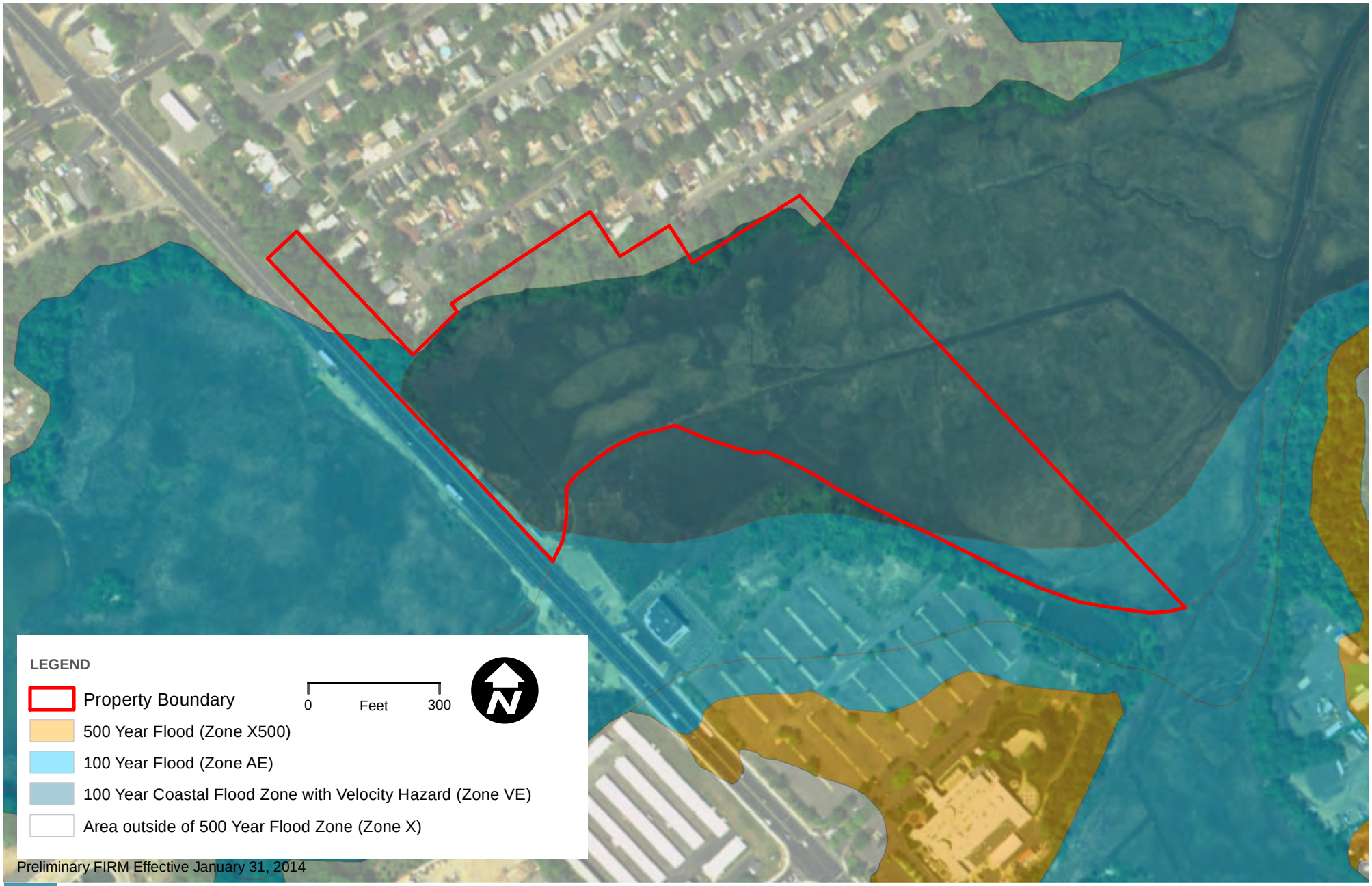


EVERGREEN WHALE CREEK SITE

PROSPECTUS

FIGURE 6 EXISTING CONDITIONS

PATH: \\MAHPI-FILE01\GIS_PROJECTS\448177_EVERGREEN ENVIRONMENTAL LLC\10038062_EVERGREEN-DB-WHALE CREEK\GIS\MXD\PROSPECTUS\FIG10_BASELINE CONDITIONS.MXD - USER: DBRIZZOL - DATE: 8/14/2017



EVERGREEN WHALE CREEK MITIGATION BANK SITE - OLD BRIDGE, MIDDLESEX COUNTY, NJ

PROSPECTUS

FIGURE 7 FEMA FLOOD MAP

PATH: \\MAHPI-FILE01\GIS_PROJECTS\448177_EVERGREEN ENVIRONMENTAL LLC\10038062_EVERGREEN-DB-WHALE CREEK\GIS\MXD\PROSPECTUS\FIG06_FEMA MAP_8-8-2016.MXD - USER: JLANGE - DATE: 1/26/2017

EVERGREEN WHALE CREEK MITIGATION BANK SITE - OLD BRIDGE, MIDDLESEX COUNTY, NJ

PROSPECTUS

FIGURE 8 TIDE GAGE LOCATIONS

PATH: Z:\448177_EVERGREEN ENVIRONMENTAL LLC\10038062_EVERGREEN-DB-WHALE CREEK\GIS\MXD\PROSPECTUS\FIG07_TIDEGAGELOCATIONS_01-27-2016.MXD - USER: DBRIZZOL - DATE: 1/27/2017

EVERGREEN WHALE CREEK MITIGATION BANK SITE - OLD BRIDGE, MIDDLESEX COUNTY, NJ

PROSPECTUS

FIGURE 9 NJDEP WETLANDS MAP

PATH: C:\USERS\JLANGE\DOCUMENTS\EVERGREEN\WHALE_CREEK_PROSPECTUS_FIGURES\FIG08_NJDEP WETLANDS MAP_1-26-2017.MXD - USER: JLANGE - DATE: 1/26/2017

EVERGREEN WHALE CREEK MITIGATION BANK SITE - OLD BRIDGE, MIDDLESEX COUNTY, NJ

PROSPECTUS

FIGURE 10 NATIONAL WETLANDS INVENTORY MAP

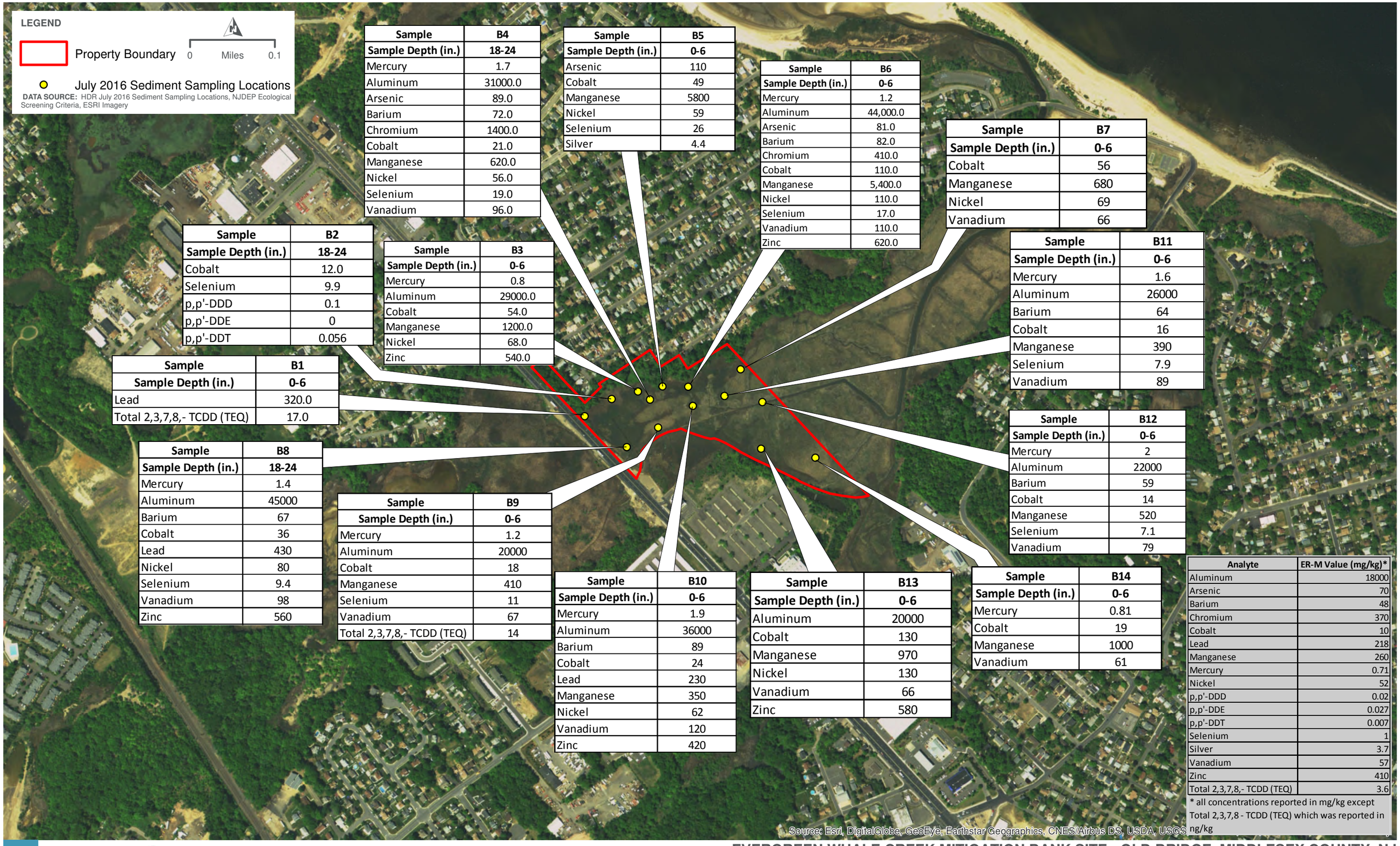
PATH: \\MAHPI-FILE01\GIS_PROJECTS\448177_EVERGREEN ENVIRONMENTAL LLC\10038062_EVERGREEN-DB-WHALE CREEK\GIS\MXD\PROSPECTUS\FIG09_NWI WETLANDS MAP_8-8-2016.MXD - USER: JLANGE - DATE: 1/26/2017

EVERGREEN WHALE CREEK MITIGATION BANK SITE - OLD BRIDGE, MIDDLESEX COUNTY, NJ

PROSPECTUS

FIGURE 11 NRCS SOILS MAP

PATH: \\MAHPI-FILE01\GIS_PROJECTS\448177_EVERGREEN ENVIRONMENTAL LLC\10038062_EVERGREEN-DB-WHALE CREEK\GIS\MXD\PROSPECTUS\FIG10_SOILS MAP_8-8-2016.MXD - USER: JLANGE - DATE: 1/26/2017



Sample	B4
Sample Depth (in.)	18-24
Mercury	1.7
Aluminum	31000.0
Arsenic	89.0
Barium	72.0
Chromium	1400.0
Cobalt	21.0
Manganese	620.0
Nickel	56.0
Selenium	19.0
Vanadium	96.0

Sample	B5
Sample Depth (in.)	0-6
Arsenic	110
Cobalt	49
Manganese	5800
Nickel	59
Selenium	26
Silver	4.4

Sample	B6
Sample Depth (in.)	0-6
Mercury	1.2
Aluminum	44,000.0
Arsenic	81.0
Barium	82.0
Chromium	410.0
Cobalt	110.0
Manganese	5,400.0
Nickel	110.0
Selenium	17.0
Vanadium	110.0
Zinc	620.0

Sample	B7
Sample Depth (in.)	0-6
Cobalt	56
Manganese	680
Nickel	69
Vanadium	66

Sample	B2
Sample Depth (in.)	18-24
Cobalt	12.0
Selenium	9.9
p,p'-DDD	0.1
p,p'-DDE	0
p,p'-DDT	0.056

Sample	B3
Sample Depth (in.)	0-6
Mercury	0.8
Aluminum	29000.0
Cobalt	54.0
Manganese	1200.0
Nickel	68.0
Zinc	540.0

Sample	B11
Sample Depth (in.)	0-6
Mercury	1.6
Aluminum	26000
Barium	64
Cobalt	16
Manganese	390
Selenium	7.9
Vanadium	89

Sample	B1
Sample Depth (in.)	0-6
Lead	320.0
Total 2,3,7,8,- TCDD (TEQ)	17.0

Sample	B12
Sample Depth (in.)	0-6
Mercury	2
Aluminum	22000
Barium	59
Cobalt	14
Manganese	520
Selenium	7.1
Vanadium	79

Sample	B8
Sample Depth (in.)	18-24
Mercury	1.4
Aluminum	45000
Barium	67
Cobalt	36
Lead	430
Nickel	80
Selenium	9.4
Vanadium	98
Zinc	560

Sample	B9
Sample Depth (in.)	0-6
Mercury	1.2
Aluminum	20000
Cobalt	18
Manganese	410
Selenium	11
Vanadium	67
Total 2,3,7,8,- TCDD (TEQ)	14

Sample	B10
Sample Depth (in.)	0-6
Mercury	1.9
Aluminum	36000
Barium	89
Cobalt	24
Lead	230
Manganese	350
Nickel	62
Vanadium	120
Zinc	420

Sample	B13
Sample Depth (in.)	0-6
Aluminum	20000
Cobalt	130
Manganese	970
Nickel	130
Vanadium	66
Zinc	580

Sample	B14
Sample Depth (in.)	0-6
Mercury	0.81
Cobalt	19
Manganese	1000
Vanadium	61

Analyte	ER-M Value (mg/kg)*
Aluminum	18000
Arsenic	70
Barium	48
Chromium	370
Cobalt	10
Lead	218
Manganese	260
Mercury	0.71
Nickel	52
p,p'-DDD	0.02
p,p'-DDE	0.027
p,p'-DDT	0.007
Selenium	1
Silver	3.7
Vanadium	57
Zinc	410
Total 2,3,7,8,- TCDD (TEQ)	3.6

* all concentrations reported in mg/kg except Total 2,3,7,8 - TCDD (TEQ) which was reported in ng/kg

EVERGREEN WHALE CREEK MITIGATION BANK SITE - OLD BRIDGE, MIDDLESEX COUNTY, NJ

PROSPECTUS

FIGURE 12 SEDIMENT SAMPLING EXCEEDANCES OF ER-M CRITERIA JULY 2016

LEGEND

Property Boundary

December 2016 Sediment Sampling Locations

0 Feet 500

DATA SOURCE: HDR December 2016 Sediment Sampling Locations, NJDEP Ecological Screening Criteria, ESRI Imagery

Analyte	ER-M Value (mg/kg)*
Aluminum	18000
Arsenic	70
Barium	48
Chromium	370
Cobalt	10
Lead	218
Manganese	260
Mercury	0.71
Nickel	52
p,p'-DDD	0.02
p,p'-DDE	0.027
p,p'-DDT	0.007
Selenium	1
Silver	3.7
Vanadium	57
Zinc	410
Total 2,3,7,8,- TCDD (TEQ)	3.6

* all concentrations reported in mg/kg except Total 2,3,7,8 - TCDD (TEQ) which was reported in ng/kg

Sample	WCSB-4
Sample Depth (in)	0-6
Aluminum	31000
Cobalt	50
Nickel	100
Selenium	17
Zinc	550
Total 2,3,7,8-TCCD (TEQ)	6.2

Sample	WCSB-5
Sample Depth (in)	5-11
Aluminum	25000
Barium	1200
Cobalt	33
Copper	320
Lead	3500
Manganese	500
Mercury	1
Nickel	70
Selenium	7.5
Vanadium	190
Zinc	1000
Total 2,3,7,8-TCCD (TEQ)	110

Sample	WCSB-3
Sample Depth (in)	0-6
Aluminum	73000
Barium	78
Cobalt	200
Lead	230
Manganese	11000
Mercury	0.71
Nickel	240
Selenium	16
Vanadium	140
Zinc	1300
Total 2,3,7,8-TCCD (TEQ)	9.4

Sample	WCSB-2
Sample Depth (in)	1-7
Aluminum	33000
Cobalt	30
Lead	240
Mercury	1.5
Nickel	61
Selenium	15
Vanadium	110
Zinc	470
Total 2,3,7,8-TCCD (TEQ)	12

Sample	WCSB-1
Sample Depth (in)	0-6
Aluminum	27000
Cobalt	28
Manganese	660
Nickel	59
Selenium	16
Vanadium	72

Sample	WCSB-7
Sample Depth (in)	0-6
Aluminum	35000
Barium	79
Cobalt	23
Lead	260
Manganese	650
Mercury	2.6
Nickel	56
Vanadium	120
Zinc	500
Total 2,3,7,8-TCCD (TEQ)	15

Sample	WCSB-10
Sample Depth (in)	0-6
Aluminum	35000
Barium	100
Chromium	390
Cobalt	40
Lead	320
Manganese	420
Mercury	1.6
Nickel	100
Selenium	16
Vanadium	140
Zinc	580
Total 2,3,7,8-TCCD (TEQ)	18

Sample	WCSB-6
Sample Depth (in)	0-6
Aluminum	55000
Arsenic	100
Barium	83
Chromium	380
Cobalt	49
Lead	360
Manganese	1100
Mercury	2.4
Nickel	94
Selenium	16
Vanadium	160
Zinc	690
Total 2,3,7,8-TCCD (TEQ)	37

Sample	WCSB-8
Sample Depth (in)	0-6
Aluminum	35000
Antimony	18
Barium	88
Cadmium	20
Cobalt	23
Lead	290
Manganese	400
Mercury	2.6
Nickel	62
Selenium	19
Vanadium	130
Zinc	500
Total 2,3,7,8-TCCD (TEQ)	20

Sample	WCSB-9
Sample Depth (in)	0-6
Aluminum	22000
Cobalt	75
Manganese	620
Mercury	1.5
Nickel	89
Vanadium	85
Zinc	480
Total 2,3,7,8-TCCD (TEQ)	12

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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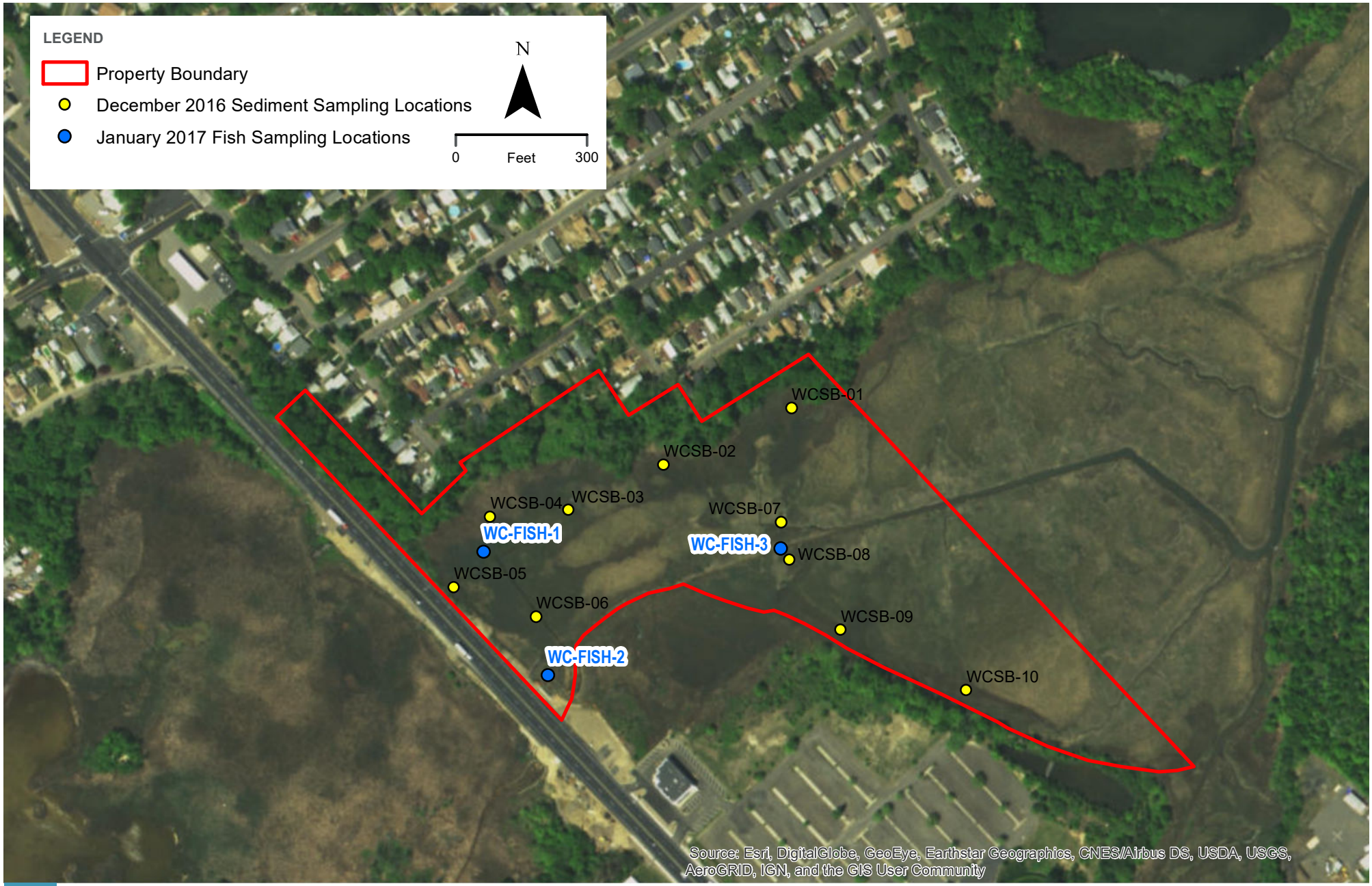
EVERGREEN WHALE CREEK MITIGATION BANK SITE - OLD BRIDGE, MIDDLESEX COUNTY, NJ

PROSPECTUS

FIGURE 13 SEDIMENT SAMPLING EXCEEDANCES OF ER-M CRITERIA DECEMBER 2016

PATH: Z:\448177_EVERGREEN ENVIRONMENTAL LLC\10038062_EVERGREEN-DB-WHALE CREEK\GIS\MXD\PROSPECTUS\FIG12_SEDIMENT SAMPLING EXCEEDENCES MAP_1-30-2016_11X17_VER2.MXD - USER: DBRIZZOL - DATE: 2/15/2017



EVERGREEN WHALE CREEK MITIGATION BANK SITE - OLD BRIDGE, MIDDLESEX COUNTY, NJ

INITIAL SITE INVESTIGATION

FIGURE 14 JANUARY 2017 FISH COLLECTION LOCATIONS

PATH: \\MAHPI-FILE01\GIS_PROJECTS\448177_EVERGREEN ENVIRONMENTAL LLC\10038062_EVERGREEN-DB-WHALE CREEK\GIS\MXD\PROSPECTUS\FIG13_FISHCOLLECTIONLOCATIONS.MXD - USER: DBRIZZOL - DATE: 6/29/2017

EVERGREEN WHALE CREEK MITIGATION BANK SITE - OLD BRIDGE, MIDDLESEX COUNTY, NJ

PROSPECTUS

FIGURE 15 NJDEP LANDSCAPE PROJECT HABITAT SUITABILITY MAP

PATH: \\MAHPI-FILE01\GIS_PROJECTS\448177_EVERGREEN ENVIRONMENTAL LLC\10038062_EVERGREEN-DB-WHALE CREEK\GIS\MXD\PROSPECTUS\FIG13_T&E MAP_8-8-2016.MXD - USER: JLANGE - DATE: 1/26/2017

Attachment B

Functional Value Assessment

Attachment B - Functional Value Assessment

As part of this assessment of the Evergreen Whale Creek Mitigation Bank, a set of wetland functions have been identified that are anticipated to be enhanced and preserved at the Bank site. Additionally, the extent to which these functions provide services beyond the limits of the bank parcel is the core of the assessment of regional watershed value and the potential ability of the Bank to compensate for wetlands functions and services lost elsewhere in the region.

The Evergreen Whale Creek Mitigation Bank will provide special and unique ecological and wetland functions. The following functions and services have been assessed at the Bank site to demonstrate functional value uplift and the appropriateness of wetland bank credit utilization to replace wetland functions and services lost as a result of permitted impacts in another part of the Service Area:

- Water Quality
- Wetland Hydrology
- Flood Storage
- Sediment/Toxicant Retention
- Nutrient Exchange
- Sediment Transport
- Sediment and Shoreline Stabilization
- Production Export
- Finfish Habitat
- Invertebrate Community
- Wildlife Habitat
- Plant Community Composition
- Endangered Species Habitat
- Social Significance

Functions and Services

Evergreen has investigated wetland bank functions and services and compared existing conditions to proposed conditions. Every wetland performs some number of functions, such as water quality improvement or wildlife habitat, which make wetlands a valued resource subjected to significant regulatory protection. The service of a wetland function is directly related to the opportunity for that function to make a measurable and meaningful difference in a particular location within its hydrogeomorphic setting. Often these services are achieved only within a localized watershed or drainage; a function such as flood storage is such an example. Other functions are realized within the broader hydrogeomorphic setting in areas that are not necessarily defined and limited to a watershed. For example, functions such as wildlife habitat, finfish habitat or public recreation can transcend drainage boundaries.

The 2008 Federal Rules go on to define the terms Functions and Services as follows:

*"**Functions** means the physical, chemical, and biological processes that occur in ecosystems.*

Services *mean the benefits that human populations receive from functions that occur in ecosystems."* (Subpart J—Compensatory Mitigation for Losses of Aquatic Resources *§ 230.92 Definitions)*

As part of this assessment of the Bank, a set of wetland functions have been identified that are anticipated to be restored, re-established, rehabilitated and enhanced at the Bank site. The extent to which these functions provide service is the core of the assessment of credits and the potential ability of the Bank to compensate for wetlands functions and services lost elsewhere in the region.

- ***Water Quality***

This function presents one of the key attributes of any wetland system: water quality improvement, maintenance and protection. It is the main reason why wetlands are regulated under the Clean Water Act. The ability of a wetland to filter and metabolize water impurities is critical to fish, wildlife and human populations of the watershed and region.

Tidal water quality, such as that to be restored at the Evergreen Whale Creek Mitigation Bank, is defined by several parameters including regional pollution levels, turbidity, salinity and dissolved oxygen. Turbidity is often a function of underlying creek and marsh substrate, disturbance due to flows and storms and, in urbanized areas, runoff and pollutant loadings. Sediment removal will restore tidal hydrology to the wetland and reduce exposure of receiving waters to contaminants in the marsh sediments. The surrounding marsh water quality and the water quality predicted to be restored to the site once the Bank design is implemented will be that of a large, contiguous, relatively undisturbed tidal marsh reconnected to the tidal marshes of the region. The Bank will serve to filter receiving waters of impurities from the adjacent waterbodies as well as runoff from adjacent developed lands.

Dissolved oxygen levels are also related to pollutant loadings, temperature, biological demand and the surface area of interaction between marsh and receiving waters. The greater the surface area of the water/marsh interface, the greater the opportunity for waters to be oxygenated. The Bank design will greatly enhance the opportunity for water/wetland interface and increase oxygenation of receiving waters.

The Bank design will serve to replace this service and function within the watershed potentially lost as a result of wetland impacts in region.

- ***Wetland Hydrology***

Tidal water conveyances, such as creeks and bays, are bordered by the wetlands, usually marshes, which they support hydrologically. This function is predicated on the ability of a wetland to provide tidal wetland hydrology via channel density; stream sinuosity; channel width; and channel depth. Restrictions to tidal flow such as elevated marsh plains, berms, tide gates, culverts and bulkheads are examples of impediments to tidal wetland hydrology.

The Bank will lower grades that have been raised. Tidal wetland hydrology will be restored to the elevated areas of the tract and improved to the entire mitigation bank site.

The Bank design will serve to replace this service and function potentially lost as a result of wetland impacts in the region.

- ***Flood Storage***

Another wetland service and function that is of value to regional populations is the ability of the wetland to protect adjacent lands from storm surges and attenuate flooding.

Tidal marshes in the region provide this function and service to adjacent developed lands. The Bank site design will open a tidally restricted property and lower site elevations to increase flood storage capacity and buffer storm surges. Net sediment removal from the site will increase flood storage capacity. The restored site will have the ability to absorb and store riverine floodwaters.

The Bank design will serve to replace this service and function potentially lost as a result of wetland impacts in the region.

- ***Sediment/Toxicant Retention***

This function relates to the effectiveness of the wetland as a trap for sediments, toxicants, or pathogens in runoff water from surrounding uplands or upstream eroding wetland areas. This function reduces or prevents degradation of water quality by the sequestration and transformation of sediment borne toxicants.

Wetland restoration has the potential for being an effective trap for sediment, toxicants, or pathogens from runoff water or tidal receiving waters. Currently, the Bank site has limited connection to tidal waters. The proposed mitigation concept would promote a higher level of marsh interface with tidal waters and promote sediment and toxicant retention and reduction through natural attenuation metabolization.

The Bank design will serve to replace this service and function potentially lost as a result of wetland impacts in the region.

- ***Nutrient Exchange***

Tidal wetlands export and/or import nutrients and organic carbon via tidal flushing, deposition and erosion. This function and service is critical to the circulation of nutrients into the food chain from tidal marshes known to be some of the most biologically productive habitats. Such exchange requires tidal conveyances as has been described above as well as an interface with the marsh substrate and plant cover that metabolizes and produces nutrients as well as makes use of such nutrients. The marsh also serves to sequester carbon as part of the marsh depositional process as well as photosynthetic biomass production.

The Bank design will restore and create tidal flushing and water/plant interface to facilitate and improve nutrient exchange. Nutrient exchange service of the wetlands at the Bank will become similar to that of the native wetlands of the region. The Bank's nutrient exchange will foster invertebrate and forage fish populations similar to those of the natural marshes of the region.

The Bank design will serve to replace this service and function potentially lost as a result of wetland impacts in the region.

- ***Sediment Transport***

The ability of a wetland site to maintain a stable elevation that supports tidal marsh hydrology and tidal marsh vegetation is predicated on sediment transport. Marsh elevation is sustained by the deposition of inorganic and organic particles from the water column, vertical accumulation of plant litter, and the removal of excess wrack, debris and plant litter (primarily through physical processes). In the ideal, stable marsh system, sediment accretion and deposition rates are balanced by sediment subsidence and erosion rates.

A marsh system must have vegetation and mudflats to trap sediments and free-flow of tidal waters to export sediments down gradient. Currently, a portion of the site is tidally above and beyond the elevation of tidal flow and the interface of tidal waters and sediments. Several factors in marsh restoration ecology affect sediment transport. Factors include the removal of hydrological obstructions (e.g., dikes, berms, culverts, etc.), which ensures that the wetland is free and open to the twice-daily exchange of tidal waters and increases the on-site coverage by native vegetation species.

The physical energies of an environment and the vegetative cover affect sediment transport, but the underlying substrate is the key factor that determines transport rates, often directly relating to particle size. The Bank will promote tidal exchange and sediment transport from the Bank site as well as to the wetlands of the region. The exchange is predicted to be a relatively balanced import and export of sediments depemdent on a stable marsh plain that serves to hold sediments while also permitting tidal waters to carry accreted organics and up-gradient sediments received via runoff flows down-gradient via the marsh plain, tidal channels and direct creek connection.

The Bank design will serve to replace this service and function potentially lost as a result of wetland impacts in the region.

- ***Sediment and Shoreline Stabilization***

The function of sediment and shoreline stabilization is related to the ability of the wetland to bind the soil matrix and dissipate the erosion forces impacting the wetland. Wetland vegetation stabilizes sediments by increasing the durability of the sediment-root matrix. Binding of sediments by roots is responsible for the greater shear strength of sediments compared to unvegetated sediments.

This function is dependent on the wetland having vegetation composed of either a dense energy absorbing, resilient herbaceous layer or a mixture of trees and large multi-stemmed shrubs that can withstand high flow velocities and/or wave action. This function is likely being provided if the wetland is so situated in the landscape, has the dense vegetation, and no evidence of such erosional signs as gullies, rills, exposed soil, scour marks, and slumping in the down gradient watercourse.

Currently the site is tidally restricted, but dense *Phragmites* has stabilized approximately half of the site's sediments. The Bank design will result in tidal flow with commensurate sediment transport to a vegetated tidal marsh that will create a stable sediment-root matrix of native plants. This vegetative cover in concert with the landscape position of the tidal marsh adjacent to several tidal waterbodies provides an ideal setting to increase sediment accretion and

shoreline stabilization functions as compared to existing conditions. The excavation of accreted and contaminated, man-made sediment, the reintroduction of tidal flows and the establishment of native emergent marsh species will create gentler stream bank slopes that are more stable.

The Bank design will serve to replace this service and function potentially lost as a result of wetland impacts in the region.

- ***Production Export***

This function evaluates the effectiveness of the wetland to produce food or usable products for humans or other living organisms.

Wetland restoration will produce plant detritus for living organisms. Compared to the *Phragmites* marsh today, *Spartina* marshes develop and export a much greater proportion of biomass. Detritus development and export will occur within this tidal emergent wetland bank. The adjacent creek and Raritan Bay provide an ideal conduit for export of biomass production from this tidal marsh wetland. The restored wetland will increase the degree of plant community structure and species diversity and thereby increase production export.

The Bank design will serve to replace this service and function potentially lost as a result of wetland impacts in the region.

- ***Finfish Habitat***

The potential utilization of a marsh by finfish is a primary wetland function and service. Variables important to this wetland function include the amount of marsh/water interface (i.e., aquatic edge), the hydrologic regime of the site, and the complexity of the habitat available to resident nekton (i.e., the amount and number of habitat types available on-site).

Improvements to finfish habitat in tidal systems can be achieved by removing tidal restrictions in order to increase the hydrologic regime within the site, increasing the amount of aquatic edge within the site (e.g., restoring the tidal drainage network by replacing straight mosquito ditches with “naturally” meandering tidal channels), and by increasing the habitat complexity within the site (e.g., the replacement of one dominant habitat type that covers a site with a mosaic composed of several different habitat types).

The Bank site will provide restored shallow water finfish habitat from a currently tidally restricted area that will benefit populations of forage fish that represent the lower levels of the food chain. Additionally, the Bank site is in an area where juvenile finfish take cover and feed until they are ready to enter the open waters of the bays and ocean. The Bank design will restore habitat for juvenile species and forage fish populations. The Bank will provide habitat for forage fish, juvenile finfish and marsh plain surface spawning habitat similar to that habitat that exists in the region.

The Bank design will serve to replace this service and function potentially lost as a result of wetland impacts in the region.

- ***Invertebrate Community***

The potential for a wetland to produce and maintain a characteristic benthic invertebrate community is a function and service directly related to the productivity of a wetland at the lowest trophic levels. This function is affected by the amount of marsh/water interface (i.e., aquatic edge) and the hydrologic regime of the site. Another variable related to this function is the relative proportion of the site that is covered with emergent macrophytic vegetation (i.e., total percent vegetative cover). To positively enhance the invertebrate community of a wetland, increasing the amount of aquatic edge and restoration of the tidal regime would be required.

The Bank design will increase the benthic invertebrate community in an area where it currently is limited. Invertebrates to benefit include benthic worms and more mobile invertebrates such as blue crabs and resident fiddler crabs and possibly mollusks such as ribbed mussels. These species of benthic invertebrates are typical of the regional tidal marsh systems of relatively low wave energy. Improved dissolved oxygen levels of the tidal channels and marsh plain also will augment this function.

The Bank design will serve to replace this service and function potentially lost as a result of wetland impacts in the region.

- ***Wildlife Habitat***

This function describes the potential utilization of the wetland by resident and migratory avifauna, herpefauna and mammals. Factors that affect this function and service include size of the wetland, its connectedness to adjacent wildlife habitat, the effective area of all undeveloped wetland or upland habitat patches within one-half mile of the wetland boundary, a measure of wildlife habitat complexibility (i.e., the number of different habitat types present on or within one-half mile of the site), and the percent cover by native plant species on the site.

The Bank design will benefit wetland dependent wildlife species including aquatic mammals (e.g., muskrat), diamondback terrapins, wading birds and waterfowl that prefer wetlands. These bird species are highly mobile, often migratory and able to move from area to area in a diurnal pattern to take advantage of tidal cycle or to take shelter in the upland/wetland marsh interface during storm events. Species have been observed to move across the Raritan Bay marshes from one end to the other to feed based on such tidal cycle variations during the course of a day in order to take advantage of prime fish-feeding opportunities.

The mitigation plan in general removes much of the accreted and manmade fill and restores wetland in a classic restoration implementation plan. This wetland restoration plan generates habitat for aquatic species such as benthic invertebrates and finfish while restoring wetland functions and services including flood storage, water quality and sediment transport.

The Bank design will serve to replace this service and function potentially lost as a result of wetland impacts in the region.

- ***Plant Community Composition***

The ability of a wetland to support a native plant community of characteristic species composition is a function of great importance and relevance in eco-restoration design. Higher contributions of exotic or nuisance species will lower this wetland function. Improving this wetland function would require the replacement of nonnative vegetation with native species.

The Bank design will serve to restore tidal hydrology, remove accreted sediments and fill and promote native vegetative species establishment in a tidal marsh that interfaces with adjacent marshes and has a component of upland island habitats. The marsh plain elevation will vary to incorporate areas inundated at varying frequencies that will be vegetated with a variety of native species. The design will also reduce non-native invasive species such as invasive *Phragmites*, and replace the habitat with native species such as *Spartina*.

The Bank design will serve to replace this service and function potentially lost as a result of wetland impacts in the region.

- ***Endangered Species Habitat***

This function considers the suitability of the wetland to support threatened or endangered species. These functions become factors when the wetland contains documented occurrence of a state- or federally-listed species. A species is considered endangered if it is in danger of extinction throughout all or a significant portion of its range. A species is considered threatened if it is likely to become endangered in the future. The Endangered Species Act of 1973 (ESA) provided a legal framework to conserve and protect species and their habitats. In this law, U.S. Congress recognized, "endangered species of fish, wildlife, and plants are of aesthetic, ecological, educational, historical, recreational, and scientific value to the Nation and its people". Congress further stated its intent that the Act should conserve the ecosystems upon which endangered and threatened species depend. The U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) share responsibility for implementing the ESA for Federally listed species. The New Jersey Division of Fish and Wildlife – Bureau of Endangered and Non-game Species and the New Jersey Natural Heritage Program are responsible for State listed threatened and endangered species.

The wetland bank has the potential to be valuable habitat for several protected species, including the glossy ibis (*Plegadis falcinellus*; NJ-special concern [SC]), snowy egret (*Egretta thula*; NJ-SC), and black-crowned night heron (*Nycticorax nycticorax*; NJ-threatened). The mitigation design will increase marsh and open water habitat for waterfowl and wading birds and increase passerine habitat and prey sources for raptors.

The restoration and preservation of the Bank site, and the habitat connectivity with the creek and adjacent tidal marshes makes the restoration of the site a key component to endangered species habitat in the region.

The Bank design will serve to replace this service and function potentially lost as a result of wetland impacts in the region.

- ***Social Significance***

The functions and services of wetlands go beyond environmental quality and wildlife benefits and include direct benefits to society. Wetlands are unique habitats that, when accessible, afford people the opportunity to see and experience landscapes and wildlife species. The loss of wetlands eliminates public access, passive recreation, and the ability to view wildlife and their habitat.

The Bank site will restore and protect wetlands of the Raritan Bay and Atlantic region. Visible from the adjacent uplands, the Bank site will provide additional opportunities for people to see and observe wetland habitat and the wildlife inhabitants. As a restoration site, it will also afford people the educational opportunity to observe a restoration project in various stages of development.

The Evergreen Whale Creek Mitigation Bank site has the opportunity to replace socially significant functions and services lost as a result of projected permitted impacts in relatively close proximity and in a virtually identical landscape position that is intended to recreate wetland habitat lost.

The Bank design will serve to replace this service and function potentially lost as a result of wetland impacts in the region.

Attachment C
(Attached CD)

Sediment Contamination Data, Site-wide Statistics and PCB Congener Evaluation

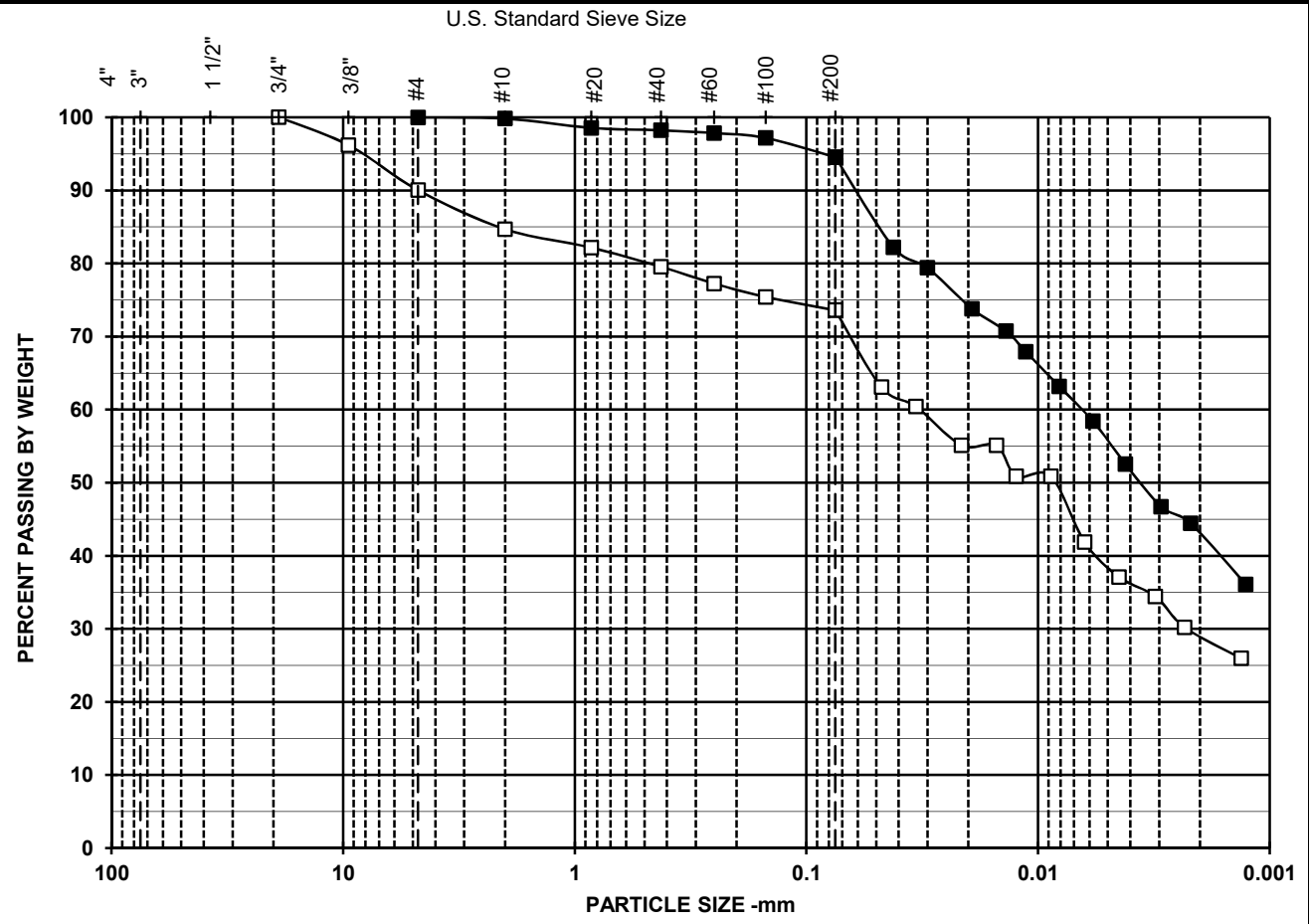
July 2016 Laboratory Results

Hampton Clarke Veritech #6071513
AC92394
LABORATORY TESTING DATA SUMMARY

GROUP ID	SAMPLE NO.	CLIENT ID	TEST DATE	IDENTIFICATION TESTS			REMARKS
				USCS SYMB. (1)	SIEVE MINUS NO. 200 (%)	HYDROMETER % MINUS 2 μm (%)	
AC92394	002	B2	7/19/2016	OH	73.6	29	
AC92394	012	B12	7/19/2016	OH	94.5	43	

Note: (1) USCS symbol based on visual observation and Sieve reported.

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



SYMBOL	w (%)	LL	PL	PI	USCS	DESCRIPTION AND REMARKS	Date Tested
□					OH	Brown, Organic silt with sand organic mat'l noted	7/19/2016
■					OH	Brown, Organic silt organic mat'l noted	7/19/2016
○							

Symbol	□	■	○
Group #	AC92394	AC92394	
ID#	002	012	
Client ID	B2	B12	
% +3"	0.0	0.0	
% Gravel	10.0	0.0	
% SAND	16.4	5.5	
%C SAND	5.3	0.2	
%M SAND	5.1	1.6	
%F SAND	5.9	3.7	
% FINES	73.6	94.5	
% -2μ	29	43	
D_{100} (mm)	19.00	9.50	
D_{60} (mm)			
D_{30} (mm)			
D_{10} (mm)			
Cc			
Cu			

Particle Size	PERCENT FINER		
(Sieve #)	□	■	○
4"			
3"			
1 1/2"			
3/4"	100.0		
3/8"	96.2		
4	90.0	100.0	
10	84.7	99.8	
20	82.2	98.6	
40	79.5	98.2	
60	77.2	97.8	
100	75.4	97.2	
200	73.6	94.5	

TerraSense, LLC

7736-16034

Hampton Clarke Veritech

6071513

PARTICLE SIZE DISTRIBUTION

AC92394

CHAIN OF CUSTODY RECORD

7736-16034

Hampton-Clarke, Inc.
175 US Hwy 46 West
Fairfield, New Jersey, 07004
Ph:800-426-9992 Fax:973-439-1458

Report To:	Invoice To:	Project #:	CocID#:
Hampton-Clarke, Inc.:	Hampton-Clarke, Inc.:	6071513	5157
Attn:Reporting	Attn:Accounting		
175 Route 46 West	175 Route 46 West		
Fairfield, New Jersey 07004	Fairfield, New Jersey 07004		

FINAL RESULTS TO: subresults@hcvlab.com
PRELIM/VERBAL RESULTS TO: subresults@hcvlab.com

EDD: NEW JERSEY HAZRESULT OR EQUIS EZEDD REQUIRED FOR ALL DATA SUBMITTALS!

Turn Around Time: Standard **Preliminary Due Date:** 8/1/2016
Report Type: NJDEP-R (REDUCED) **Hard Copy Due Date:** 8/9/2016

Sample Number:	Client ID	Matrix:	Date Collected:	Time Collected:	Analysis Requested
AC92394-002	B2	Sedimen	7/14/2016	10:40:00 AM	Sieve w/hydrometer D-422
AC92394-012	B12	Sedimen	7/14/2016	10:40:00 AM	Sieve w/hydrometer D-422

Relinquished By:	Accepted By:	Date:	Time:	Comments, Notes, Special Requirements, HAZARDS
	Thomas	7/19/16	11:24	

Cooler Temp:_____

HC Lab Use Only: **Subcontracted Lab Id and Contact:** Greg Thomas, (973) 256-0494, LabID: H, 45H Commerce Way, , Totowa, NJ, 07512

Pace Analytical Services, Inc.
1700 Elm Street
Minneapolis, MN 55414
Phone: 612.607.1700
Fax: 612.607.6444

www.pacelabs.com

Report Prepared for:

Alissa Ruccatano
Veritech
175 US Hwy 46 West
Fairfield NJ 07004

REPORT OF LABORATORY ANALYSIS FOR PCDD/PCDF

Report Prepared Date:
July 27, 2016

Report Information:

Pace Project #: 10355913
Sample Receipt Date: 07/19/2016
Client Project #: 6071513
Client Sub PO #: N/A
State Cert #: MN002

Invoicing & Reporting Options:

The report provided has been invoiced as a Level 2 PCDD/PCDF Report. If an upgrade of this report package is requested, an additional charge may be applied.

Please review the attached invoice for accuracy and forward any questions to Nathan Boberg, your Pace Project Manager.

This report has been reviewed by:

July 29, 2016
Nathan Boberg, Project Manager

(612) 607-6444 (fax)
nathan.boberg@pacelabs.com

Report of Laboratory Analysis

Pace Analytical Services, Inc.
1700 Elm Street
Minneapolis, MN 55414
Phone: 612.607.1700
Fax: 612.607.6444

DISCUSSION

This report presents the results from the analyses performed on six samples submitted by a representative of Veritech. The samples were analyzed for the presence or absence of polychlorodibenzo-p-dioxins (PCDDs) and polychlorodibenzofurans (PCDFs) using a modified version of USEPA Method 8290. The reporting limits were set to correspond to the lowest calibration points and were adjusted for sample amount.

Second column confirmation analyses of 2,3,7,8-TCDF values obtained from the primary (DB5-MS) column are performed only when specifically requested for a project and only when the values are above the concentration of the lowest calibration standard. Typical resolution for this isomer using the DB5-MS column ranges from 25-30%.

The recoveries of the isotopically-labeled PCDD/PCDF internal standards in the sample extracts ranged from 52-121%. Except for one elevated value, which was flagged "R" on the results table, the labeled standard recoveries obtained for this project were within the 40-135% target range specified in Method 8290. Also, since the quantification of the native 2,3,7,8-substituted congeners was based on isotope dilution, the data were automatically corrected for recovery and accurate values were obtained. Concentrations above the calibration range were flagged "E" and should be regarded as estimates.

A laboratory method blank was prepared and analyzed with the sample batch as part of our routine quality control procedures. The results show the blank to be free of PCDDs and PCDFs at the reporting limits. These results indicate that the sample processing steps did not significantly impact the results of the field sample determinations.

Laboratory and matrix spike samples were also prepared using clean sand or sample matrix that had been fortified with native standard materials. The results show that the spiked native compounds were generally recovered at 79-110% with relative percent differences (RPDs) generally from 1.1-16.2%. The background-subtracted recoveries obtained for HpCDD and OCDD in the matrix spike and/or matrix spike duplicate were outside the 70-130% target range. Also, the RPD values obtained for HpCDD and OCDD in the matrix spike analyses were above the 20% target upper limit. These deviations may be due to the levels of the affected congeners in the sample material and/or sample inhomogeneity.

The response obtained for the labeled 1,2,3,4,7,8-HxCDF in calibration standard analysis U160725A_17 was outside the target range. As specified in our procedures, the average of the daily response factors for this compound was used in the calculations for the samples from this runshift. The affected values were flagged "Y" on the results tables. It should be noted that the accuracy of the native congener determinations was not impacted by this deviation.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Minnesota Laboratory Certifications

Authority	Certificate #	Authority	Certificate #
A2LA	2926.01	Mississippi	MN00064
Alabama	40770	Montana	92
Alaska	MN00064	Nebraska	NE-OS-18-06
Arizona	AZ0014	Nevada	MN_00064_200
Arkansas	88-0680	New Jersey (NE	MN002
California	01155CA	New York (NEL	11647
Colorado	MN00064	North Carolina	27700
Connecticut	PH-0256	North Dakota	R-036
EPA Region 8	8TMS-Q	Ohio	4150
Florida (NELAP	E87605	Oklahoma	D9922
Georgia (DNR)	959	Oregon (ELAP)	MN200001-005
Guam	959	Oregon (OREL	MN300001-001
Hawaii	SLD	Pennsylvania	68-00563
Idaho	MN00064	Puerto Rico	MN00064
Illinois	200012	Saipan	MP0003
Indiana	C-MN-01	South Carolina	74003001
Indiana	C-MN-01	Tennessee	TN02818
Iowa	368	Texas	T104704192-08
Kansas	E-10167	Utah (NELAP)	MN00064
Kentucky	90062	Virginia	00251
Louisiana	03086	Washington	C755
Maine	2007029	West Virginia #	9952C
Maryland	322	West Virginia D	382
Michigan	9909	Wisconsin	999407970
Minnesota	027-053-137	Wyoming	8TMS-Q

REPORT OF LABORATORY ANALYSIS

Appendix A

Sample Management

Report No....10355913_8290

CHAIN OF CUSTODY RECORD

Hampton-Clarke, Inc.
175 US Hwy 46 West
Fairfield, New Jersey, 07004
Ph:800-426-9992 Fax:973-439-1458

10355913

Report To:	Invoice To:	Project #:	CocID#:
Hampton-Clarke, Inc.:	Hampton-Clarke, Inc.:	6071513	5155
Attn:Reporting	Attn:Accounting		
175 Route 46 West	175 Route 46 West		
Fairfield, New Jersey 07004	Fairfield, New Jersey 07004		

FINAL RESULTS TO: subresults@hcvlab.com
PRELIM/VERBAL RESULTS TO: subresults@hcvlab.com

EDD: NEW JERSEY HAZRESULT OR EQUIS EZEDD REQUIRED FOR ALL DATA SUBMITTALS!

Turn Around Time: Standard **Preliminary Due Date:** 8/2/2016
Report Type: NJDEP-R (REDUCED) **Hard Copy Due Date:** 8/9/2016

Sample Number:	Client ID	Matrix:	Date Collected:	Time Collected:	Analysis Requested	
AC92394-001	B1	Sedimen	7/14/2016	10:45:00 AM	Dioxins/Furans 8290	001
AC92394-007	B7	Sedimen	7/14/2016	9:45:00 AM	Dioxins/Furans 8290	002
AC92394-009	B9	Sedimen	7/14/2016	9:15:00 AM	Dioxins/Furans 8290	003
AC92394-010	B10	Sedimen	7/14/2016	9:00:00 AM	Dioxins/Furans 8290	004
AC92394-011	B11	Sedimen	7/14/2016	10:45:00 AM	Dioxins/Furans 8290	005
AC92394-014	B14	Sedimen	7/14/2016	10:20:00 AM	Dioxins/Furans 8290	006

Relinquished By:	Accepted By:	Date:	Time:	Comments, Notes, Special Requirements, HAZARDS
UPS	UPS	7/18/16	1700	T= 2.9
	PACE	7-19-16	900	

Cooler Temp:_____

HC Lab Use Only: **Subcontracted Lab Id and Contact:** PACE, Scott Unze, (612) 608-6383, LabID: H, 1700 Elm Street, Suite 200, Minneapolis, MN, 55414

Pace Analytical	Document Name: **Sample Condition Upon Receipt Form**	Document Revised: 04Apr2016 Page 1 of 1
	Document No.: **F-MN-L-213-rev.16**	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt

Client Name: Hampton-Clarke, Inc.

Project #: WO# : 10355913

10355913

Courier: ☐ Fed Ex ☑ UPS ☐ USPS ☐ Client
☐ Commercial ☐ Pace ☐ SpeeDee ☐ Other:

Tracking Number: 1Z 1X7 842 13 0896 4430

Custody Seal on Cooler/Box Present? ☐ Yes ☑ No **Seals Intact?** ☑ Yes ☐ No **Optional:** Proj. Due Date: Proj. Name:

Packing Material: ☐ Bubble Wrap ☑ Bubble Bags ☐ None ☐ Other: **Temp Blank?** ☐ Yes ☑ No

Thermometer Used: ☐ 151401163 ☑ B88A912167504 ☐ 151401164 ☐ B88A0143310098 **Type of Ice:** ☑ Wet ☐ Blue ☐ None ☐ Samples on ice, cooling process has begun

Cooler Temp Read (°C): 2.9° **Cooler Temp Corrected (°C):** 2.9° **Biological Tissue Frozen?** ☐ Yes ☐ No ☑ N/A

Temp should be above freezing to 6°C **Correction Factor:** 1.0 **Date and Initials of Person Examining Contents:** 7/19/16 AKA

USDA Regulated Soil (☐ N/A, water sample)

Did samples originate in a quarantine zone within the United States: AL, AR, AZ, CA, FL, GA, ID, LA. MS, NC, NM, NY, OK, OR, SC, TN, TX or VA (check maps)? ☐ Yes ☑ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☑ No

If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

				COMMENTS:
Chain of Custody Present?	☑ Yes	☐ No	☐ N/A	1.
Chain of Custody Filled Out?	☑ Yes	☐ No	☐ N/A	2.
Chain of Custody Relinquished?	☑ Yes	☐ No	☐ N/A	3. AKA 7/19/16
Sampler Name and/or Signature on COC?	☐ Yes	☑ No	☐ N/A	4.
Samples Arrived within Hold Time?	☑ Yes	☐ No	☐ N/A	5.
Short Hold Time Analysis (<72 hr)?	☐ Yes	☑ No	☐ N/A	6.
Rush Turn Around Time Requested?	☐ Yes	☑ No	☐ N/A	7.
Sufficient Volume?	☑ Yes	☐ No	☐ N/A	8.
Correct Containers Used?	☑ Yes	☐ No	☐ N/A	9.
-Pace Containers Used?	☐ Yes	☑ No	☐ N/A	
Containers Intact?	☑ Yes	☐ No	☐ N/A	10.
Filtered Volume Received for Dissolved Tests?	☐ Yes	☐ No	☑ N/A	11. Note if sediment is visible in the dissolved container
Sample Labels Match COC? -Includes Date/Time/ID/Analysis Matrix: SL	☑ Yes	☐ No	☐ N/A	12.
All containers needing acid/base preservation have been checked?	☐ Yes	☐ No	☑ N/A	13. ☐ HNO_3 ☐ H_2SO_4 ☐ NaOH ☐ HCl Sample #
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO_3, H_2SO_4, HCl<2; NaOH >9 Sulfide, NaOH>12 Cyanide)	☐ Yes	☐ No	☑ N/A	
Exceptions: VOA, Coliform, TOC, Oil and Grease, DRO/8015 (water) DOC	☐ Yes	☐ No	☑ N/A	Initial when completed: Lot # of added preservative:
Headspace in VOA Vials (>6mm)?	☐ Yes	☐ No	☑ N/A	14.
Trip Blank Present?	☐ Yes	☐ No	☑ N/A	15.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☑ N/A	
Pace Trip Blank Lot # (if purchased):				

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐ Yes ☐ No

Person Contacted: Date/Time:

Comments/Resolution:

Project Manager Review: Nathan Boberg **Date:** 7/19/16

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

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Reporting Flags

A = Reporting Limit based on signal to noise

B = Less than 10x higher than method blank level

C = Result obtained from confirmation analysis

D = Result obtained from analysis of diluted sample

E = Exceeds calibration range

I = Interference present

J = Estimated value

Nn = Value obtained from additional analysis

P = PCDE Interference

R = Recovery outside target range

S = Peak saturated

U = Analyte not detected

V = Result verified by confirmation analysis

X = %D Exceeds limits

Y = Calculated using average of daily RFs

* = See Discussion

Appendix B

Sample Analysis Summary

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Method 8290 Sample Analysis Results

Client - Veritech

Client's Sample ID	AC92394-001		
Lab Sample ID	10355913001		
Filename	U160725A_11		
Injected By	BAL		
Total Amount Extracted	12.0 g	Matrix	Sediment
% Moisture	30.1	Dilution	NA
Dry Weight Extracted	8.39 g	Collected	07/14/2016 10:45
ICAL ID	U160719	Received	07/19/2016 09:40
CCal Filename(s)	U160724B_19 & U160725A_17	Extracted	07/20/2016 16:00
Method Blank ID	BLANK-51144	Analyzed	07/25/2016 18:21

Native Isomers	**Conc** ng/Kg	**EMPC** ng/Kg	**RL** ng/Kg		**Internal Standards**	**ng's Added**	**Percent Recovery**
2,3,7,8-TCDF	8.3	-----	1.2		2,3,7,8-TCDF-13C	2.00	77
Total TCDF	150.0	-----	1.2		2,3,7,8-TCDD-13C	2.00	96
					1,2,3,7,8-PeCDF-13C	2.00	78
2,3,7,8-TCDD	ND	-----	1.2		2,3,4,7,8-PeCDF-13C	2.00	79
Total TCDD	11.0	-----	1.2		1,2,3,7,8-PeCDD-13C	2.00	101
					1,2,3,4,7,8-HxCDF-13C	2.00	121 Y
1,2,3,7,8-PeCDF	ND	-----	6.0		1,2,3,6,7,8-HxCDF-13C	2.00	71
2,3,4,7,8-PeCDF	21.0	-----	6.0		2,3,4,6,7,8-HxCDF-13C	2.00	74
Total PeCDF	260.0	-----	6.0		1,2,3,7,8,9-HxCDF-13C	2.00	76
					1,2,3,4,7,8-HxCDD-13C	2.00	90
1,2,3,7,8-PeCDD	ND	-----	6.0		1,2,3,6,7,8-HxCDD-13C	2.00	70
Total PeCDD	9.2	-----	6.0		1,2,3,4,6,7,8-HpCDF-13C	2.00	64
					1,2,3,4,7,8,9-HpCDF-13C	2.00	64
1,2,3,4,7,8-HxCDF	13.0	-----	6.0		1,2,3,4,6,7,8-HpCDD-13C	2.00	71
1,2,3,6,7,8-HxCDF	10.0	-----	6.0		OCDD-13C	4.00	52
2,3,4,6,7,8-HxCDF	8.5	-----	6.0				
1,2,3,7,8,9-HxCDF	ND	-----	6.0		1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	180.0	-----	6.0		1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	-----	6.0		2,3,7,8-TCDD-37Cl4	0.20	87
1,2,3,6,7,8-HxCDD	9.0	-----	6.0				
1,2,3,7,8,9-HxCDD	6.0	-----	6.0				
Total HxCDD	87.0	-----	6.0				
1,2,3,4,6,7,8-HpCDF	76.0	-----	6.0		Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	-----	6.0		Equivalence: 17 ng/Kg		
Total HpCDF	130.0	-----	6.0		(Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	150.0	-----	6.0				
Total HpCDD	310.0	-----	6.0				
OCDF	120.0	-----	12.0				
OCDD	9700.0	-----	12.0	E			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).
EMPC = Estimated Maximum Possible Concentration
RL = Reporting Limit

ND = Not Detected
NA = Not Applicable
NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.
E = Exceeds calibration range
Y = Calculated using average of daily RFs

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Method 8290 Sample Analysis Results

Client - Veritech

Client's Sample ID	AC92394-007		
Lab Sample ID	10355913002		
Filename	U160725A_06		
Injected By	BAL		
Total Amount Extracted	15.0 g	Matrix	Sediment
% Moisture	82.8	Dilution	NA
Dry Weight Extracted	2.58 g	Collected	07/14/2016 09:45
ICAL ID	U160719	Received	07/19/2016 09:40
CCal Filename(s)	U160724B_19 & U160725A_17	Extracted	07/20/2016 16:00
Method Blank ID	BLANK-51144	Analyzed	07/25/2016 14:41

Native Isomers	**Conc** ng/Kg	**EMPC** ng/Kg	**RL** ng/Kg	**Internal Standards**	**ng's Added**	**Percent Recovery**
2,3,7,8-TCDF	4.8	-----	3.9	2,3,7,8-TCDF-13C	2.00	73
Total TCDF	31.0	-----	3.9	2,3,7,8-TCDD-13C	2.00	90
				1,2,3,7,8-PeCDF-13C	2.00	79
2,3,7,8-TCDD	ND	-----	3.9	2,3,4,7,8-PeCDF-13C	2.00	78
Total TCDD	4.1	-----	3.9	1,2,3,7,8-PeCDD-13C	2.00	98
				1,2,3,4,7,8-HxCDF-13C	2.00	98 Y
1,2,3,7,8-PeCDF	ND	-----	19.0	1,2,3,6,7,8-HxCDF-13C	2.00	68
2,3,4,7,8-PeCDF	ND	-----	19.0	2,3,4,6,7,8-HxCDF-13C	2.00	74
Total PeCDF	ND	-----	19.0	1,2,3,7,8,9-HxCDF-13C	2.00	74
				1,2,3,4,7,8-HxCDD-13C	2.00	83
1,2,3,7,8-PeCDD	ND	-----	19.0	1,2,3,6,7,8-HxCDD-13C	2.00	76
Total PeCDD	ND	-----	19.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	73
				1,2,3,4,7,8,9-HpCDF-13C	2.00	72
1,2,3,4,7,8-HxCDF	ND	-----	19.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	83
1,2,3,6,7,8-HxCDF	ND	-----	19.0	OCDD-13C	4.00	64
2,3,4,6,7,8-HxCDF	ND	-----	19.0			
1,2,3,7,8,9-HxCDF	ND	-----	19.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	-----	19.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	-----	19.0	2,3,7,8-TCDD-37Cl4	0.20	83
1,2,3,6,7,8-HxCDD	ND	-----	19.0			
1,2,3,7,8,9-HxCDD	ND	-----	19.0			
Total HxCDD	71.0	-----	19.0			
1,2,3,4,6,7,8-HpCDF	26.0	-----	19.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	-----	19.0	Equivalence: 2.6 ng/Kg		
Total HpCDF	26.0	-----	19.0	(Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	110.0	-----	19.0			
Total HpCDD	230.0	-----	19.0			
OCDF	39.0	-----	39.0			
OCDD	2500.0	-----	39.0			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).
EMPC = Estimated Maximum Possible Concentration
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NC = Not Calculated

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Method 8290 Sample Analysis Results

Client - Veritech

Client's Sample ID	AC92394-009		
Lab Sample ID	10355913003		
Filename	U160725A_07		
Injected By	BAL		
Total Amount Extracted	14.4 g	Matrix	Sediment
% Moisture	74.4	Dilution	NA
Dry Weight Extracted	3.69 g	Collected	07/14/2016 09:15
ICAL ID	U160719	Received	07/19/2016 09:40
CCal Filename(s)	U160724B_19 & U160725A_17	Extracted	07/20/2016 16:00
Method Blank ID	BLANK-51144	Analyzed	07/25/2016 15:25

Native Isomers	**Conc** ng/Kg	**EMPC** ng/Kg	**RL** ng/Kg	**Internal Standards**	**ng's Added**	**Percent Recovery**
2,3,7,8-TCDF	8.7	-----	2.7	2,3,7,8-TCDF-13C	2.00	80
Total TCDF	74.0	-----	2.7	2,3,7,8-TCDD-13C	2.00	99
				1,2,3,7,8-PeCDF-13C	2.00	84
2,3,7,8-TCDD	ND	-----	2.7	2,3,4,7,8-PeCDF-13C	2.00	80
Total TCDD	7.3	-----	2.7	1,2,3,7,8-PeCDD-13C	2.00	103
				1,2,3,4,7,8-HxCDF-13C	2.00	107 Y
1,2,3,7,8-PeCDF	ND	-----	14.0	1,2,3,6,7,8-HxCDF-13C	2.00	73
2,3,4,7,8-PeCDF	ND	-----	14.0	2,3,4,6,7,8-HxCDF-13C	2.00	82
Total PeCDF	43.0	-----	14.0	1,2,3,7,8,9-HxCDF-13C	2.00	74
				1,2,3,4,7,8-HxCDD-13C	2.00	94
1,2,3,7,8-PeCDD	ND	-----	14.0	1,2,3,6,7,8-HxCDD-13C	2.00	76
Total PeCDD	ND	-----	14.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	77
				1,2,3,4,7,8,9-HpCDF-13C	2.00	75
1,2,3,4,7,8-HxCDF	ND	-----	14.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	88
1,2,3,6,7,8-HxCDF	ND	-----	14.0	OCDD-13C	4.00	68
2,3,4,6,7,8-HxCDF	ND	-----	14.0			
1,2,3,7,8,9-HxCDF	ND	-----	14.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	56.0	-----	14.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	-----	14.0	2,3,7,8-TCDD-37Cl4	0.20	90
1,2,3,6,7,8-HxCDD	19.0	-----	14.0			
1,2,3,7,8,9-HxCDD	22.0	-----	14.0			
Total HxCDD	190.0	-----	14.0			
1,2,3,4,6,7,8-HpCDF	89.0	-----	14.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	-----	14.0	Equivalence: 14 ng/Kg		
Total HpCDF	160.0	-----	14.0	(Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	440.0	-----	14.0			
Total HpCDD	1000.0	-----	14.0			
OCDF	140.0	-----	27.0			
OCDD	11000.0	-----	27.0			

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Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Method 8290 Sample Analysis Results

Client - Veritech

Client's Sample ID	AC92394-010		
Lab Sample ID	10355913004		
Filename	U160725A_08		
Injected By	BAL		
Total Amount Extracted	14.4 g	Matrix	Sediment
% Moisture	68.2	Dilution	NA
Dry Weight Extracted	4.58 g	Collected	07/14/2016 09:00
ICAL ID	U160719	Received	07/19/2016 09:40
CCal Filename(s)	U160724B_19 & U160725A_17	Extracted	07/20/2016 16:00
Method Blank ID	BLANK-51144	Analyzed	07/25/2016 16:09

Native Isomers	**Conc** ng/Kg	**EMPC** ng/Kg	**RL** ng/Kg	**Internal Standards**	**ng's Added**	**Percent Recovery**
2,3,7,8-TCDF	7.3	-----	2.2	2,3,7,8-TCDF-13C	2.00	80
Total TCDF	49.0	-----	2.2	2,3,7,8-TCDD-13C	2.00	102
				1,2,3,7,8-PeCDF-13C	2.00	86
2,3,7,8-TCDD	ND	-----	2.2	2,3,4,7,8-PeCDF-13C	2.00	84
Total TCDD	7.6	-----	2.2	1,2,3,7,8-PeCDD-13C	2.00	104
				1,2,3,4,7,8-HxCDF-13C	2.00	106 Y
1,2,3,7,8-PeCDF	ND	-----	11.0	1,2,3,6,7,8-HxCDF-13C	2.00	71
2,3,4,7,8-PeCDF	ND	-----	11.0	2,3,4,6,7,8-HxCDF-13C	2.00	77
Total PeCDF	14.0	-----	11.0	1,2,3,7,8,9-HxCDF-13C	2.00	72
				1,2,3,4,7,8-HxCDD-13C	2.00	93
1,2,3,7,8-PeCDD	ND	-----	11.0	1,2,3,6,7,8-HxCDD-13C	2.00	76
Total PeCDD	ND	-----	11.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	72
				1,2,3,4,7,8,9-HpCDF-13C	2.00	73
1,2,3,4,7,8-HxCDF	ND	-----	11.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	84
1,2,3,6,7,8-HxCDF	ND	-----	11.0	OCDD-13C	4.00	62
2,3,4,6,7,8-HxCDF	ND	-----	11.0			
1,2,3,7,8,9-HxCDF	ND	-----	11.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	15.0	-----	11.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	-----	11.0	2,3,7,8-TCDD-37Cl4	0.20	98
1,2,3,6,7,8-HxCDD	ND	-----	11.0			
1,2,3,7,8,9-HxCDD	ND	-----	11.0			
Total HxCDD	84.0	-----	11.0			
1,2,3,4,6,7,8-HpCDF	30.0	-----	11.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	-----	11.0	Equivalence: 3.5 ng/Kg		
Total HpCDF	52.0	-----	11.0	(Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	120.0	-----	11.0			
Total HpCDD	310.0	-----	11.0			
OCDF	50.0	-----	22.0			
OCDD	4000.0	-----	22.0			

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REPORT OF LABORATORY ANALYSIS

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1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Method 8290 Sample Analysis Results

Client - Veritech

Client's Sample ID	AC92394-011		
Lab Sample ID	10355913005		
Filename	U160725A_09		
Injected By	BAL		
Total Amount Extracted	14.6 g	Matrix	Sediment
% Moisture	56.5	Dilution	NA
Dry Weight Extracted	6.35 g	Collected	07/14/2016 10:45
ICAL ID	U160719	Received	07/19/2016 09:40
CCal Filename(s)	U160724B_19 & U160725A_17	Extracted	07/20/2016 16:00
Method Blank ID	BLANK-51144	Analyzed	07/25/2016 16:53

Native Isomers	**Conc** ng/Kg	**EMPC** ng/Kg	**RL** ng/Kg	**Internal Standards**	**ng's Added**	**Percent Recovery**
2,3,7,8-TCDF	4.3	-----	1.6	2,3,7,8-TCDF-13C	2.00	79
Total TCDF	25.0	-----	1.6	2,3,7,8-TCDD-13C	2.00	97
				1,2,3,7,8-PeCDF-13C	2.00	85
2,3,7,8-TCDD	ND	-----	1.6	2,3,4,7,8-PeCDF-13C	2.00	83
Total TCDD	4.3	-----	1.6	1,2,3,7,8-PeCDD-13C	2.00	105
				1,2,3,4,7,8-HxCDF-13C	2.00	105 Y
1,2,3,7,8-PeCDF	ND	-----	7.9	1,2,3,6,7,8-HxCDF-13C	2.00	72
2,3,4,7,8-PeCDF	ND	-----	7.9	2,3,4,6,7,8-HxCDF-13C	2.00	78
Total PeCDF	20.0	-----	7.9	1,2,3,7,8,9-HxCDF-13C	2.00	69
				1,2,3,4,7,8-HxCDD-13C	2.00	94
1,2,3,7,8-PeCDD	ND	-----	7.9	1,2,3,6,7,8-HxCDD-13C	2.00	72
Total PeCDD	ND	-----	7.9	1,2,3,4,6,7,8-HpCDF-13C	2.00	71
				1,2,3,4,7,8,9-HpCDF-13C	2.00	70
1,2,3,4,7,8-HxCDF	ND	-----	7.9	1,2,3,4,6,7,8-HpCDD-13C	2.00	81
1,2,3,6,7,8-HxCDF	ND	-----	7.9	OCDD-13C	4.00	66
2,3,4,6,7,8-HxCDF	ND	-----	7.9			
1,2,3,7,8,9-HxCDF	ND	-----	7.9	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	12.0	-----	7.9	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	-----	7.9	2,3,7,8-TCDD-37Cl4	0.20	88
1,2,3,6,7,8-HxCDD	ND	-----	7.9			
1,2,3,7,8,9-HxCDD	ND	-----	7.9			
Total HxCDD	57.0	-----	7.9			
1,2,3,4,6,7,8-HpCDF	27.0	-----	7.9	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	-----	7.9	Equivalence: 2.3 ng/Kg		
Total HpCDF	49.0	-----	7.9	(Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	84.0	-----	7.9			
Total HpCDD	200.0	-----	7.9			
OCDF	43.0	-----	16.0			
OCDD	2400.0	-----	16.0			

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Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Method 8290 Sample Analysis Results

Client - Veritech

Client's Sample ID	AC92394-014		
Lab Sample ID	10355913006		
Filename	U160725A_10		
Injected By	BAL		
Total Amount Extracted	14.3 g	Matrix	Sediment
% Moisture	80.3	Dilution	NA
Dry Weight Extracted	2.82 g	Collected	07/14/2016 10:20
ICAL ID	U160719	Received	07/19/2016 09:40
CCal Filename(s)	U160724B_19 & U160725A_17	Extracted	07/20/2016 16:00
Method Blank ID	BLANK-51144	Analyzed	07/25/2016 17:37

Native Isomers	**Conc** ng/Kg	**EMPC** ng/Kg	**RL** ng/Kg	**Internal Standards**	**ng's Added**	**Percent Recovery**
2,3,7,8-TCDF	ND	-----	3.5	2,3,7,8-TCDF-13C	2.00	80
Total TCDF	5.0	-----	3.5	2,3,7,8-TCDD-13C	2.00	98
				1,2,3,7,8-PeCDF-13C	2.00	85
2,3,7,8-TCDD	ND	-----	3.5	2,3,4,7,8-PeCDF-13C	2.00	81
Total TCDD	ND	-----	3.5	1,2,3,7,8-PeCDD-13C	2.00	102
				1,2,3,4,7,8-HxCDF-13C	2.00	108 Y
1,2,3,7,8-PeCDF	ND	-----	18.0	1,2,3,6,7,8-HxCDF-13C	2.00	72
2,3,4,7,8-PeCDF	ND	-----	18.0	2,3,4,6,7,8-HxCDF-13C	2.00	80
Total PeCDF	ND	-----	18.0	1,2,3,7,8,9-HxCDF-13C	2.00	77
				1,2,3,4,7,8-HxCDD-13C	2.00	90
1,2,3,7,8-PeCDD	ND	-----	18.0	1,2,3,6,7,8-HxCDD-13C	2.00	80
Total PeCDD	ND	-----	18.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	76
				1,2,3,4,7,8,9-HpCDF-13C	2.00	78
1,2,3,4,7,8-HxCDF	ND	-----	18.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	94
1,2,3,6,7,8-HxCDF	ND	-----	18.0	OCDD-13C	4.00	68
2,3,4,6,7,8-HxCDF	ND	-----	18.0			
1,2,3,7,8,9-HxCDF	ND	-----	18.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	-----	18.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	-----	18.0	2,3,7,8-TCDD-37Cl4	0.20	95
1,2,3,6,7,8-HxCDD	ND	-----	18.0			
1,2,3,7,8,9-HxCDD	ND	-----	18.0			
Total HxCDD	18.0	-----	18.0			
1,2,3,4,6,7,8-HpCDF	ND	-----	18.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	-----	18.0	Equivalence: 1.0 ng/Kg		
Total HpCDF	ND	-----	18.0	(Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	60.0	-----	18.0			
Total HpCDD	130.0	-----	18.0			
OCDF	ND	-----	35.0			
OCDD	1400.0	-----	35.0			

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Tel: 612-607-1700
Fax: 612- 607-6444

Method 8290 Blank Analysis Results

Lab Sample ID	BLANK-51144	Matrix	Solid
Filename	U160724A_07	Dilution	NA
Total Amount Extracted	20.3 g	Extracted	07/20/2016 16:00
ICAL ID	U160719	Analyzed	07/24/2016 15:32
CCal Filename(s)	U160723B_18 & U160724A_09	Injected By	BAL

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	-----	0.49	2,3,7,8-TCDF-13C	2.00	80
Total TCDF	ND	-----	0.49	2,3,7,8-TCDD-13C	2.00	101
				1,2,3,7,8-PeCDF-13C	2.00	84
2,3,7,8-TCDD	ND	-----	0.49	2,3,4,7,8-PeCDF-13C	2.00	84
Total TCDD	ND	-----	0.49	1,2,3,7,8-PeCDD-13C	2.00	104
				1,2,3,4,7,8-HxCDF-13C	2.00	79
1,2,3,7,8-PeCDF	ND	-----	2.50	1,2,3,6,7,8-HxCDF-13C	2.00	84
2,3,4,7,8-PeCDF	ND	-----	2.50	2,3,4,6,7,8-HxCDF-13C	2.00	87
Total PeCDF	ND	-----	2.50	1,2,3,7,8,9-HxCDF-13C	2.00	78
				1,2,3,4,7,8-HxCDD-13C	2.00	86
1,2,3,7,8-PeCDD	ND	-----	2.50	1,2,3,6,7,8-HxCDD-13C	2.00	91
Total PeCDD	ND	-----	2.50	1,2,3,4,6,7,8-HpCDF-13C	2.00	74
				1,2,3,4,7,8,9-HpCDF-13C	2.00	64
1,2,3,4,7,8-HxCDF	ND	-----	2.50	1,2,3,4,6,7,8-HpCDD-13C	2.00	80
1,2,3,6,7,8-HxCDF	ND	-----	2.50	OCDD-13C	4.00	52
2,3,4,6,7,8-HxCDF	ND	-----	2.50			
1,2,3,7,8,9-HxCDF	ND	-----	2.50	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	-----	2.50	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	-----	2.50	2,3,7,8-TCDD-37Cl4	0.20	89
1,2,3,6,7,8-HxCDD	ND	-----	2.50			
1,2,3,7,8,9-HxCDD	ND	-----	2.50			
Total HxCDD	ND	-----	2.50			
1,2,3,4,6,7,8-HpCDF	ND	-----	2.50	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	-----	2.50	Equivalence: 0.00 ng/Kg		
Total HpCDF	ND	-----	2.50	(Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	ND	-----	2.50			
Total HpCDD	ND	-----	2.50			
OCDF	ND	-----	4.90			
OCDD	ND	-----	4.90			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).
EMPC = Estimated Maximum Possible Concentration
RL = Reporting Limit

Results reported on a total weight basis and are valid to no more than 2 significant figures.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Method 8290 Laboratory Control Spike Results

Lab Sample ID	LCS-51145		
Filename	U160724A_01	Matrix	Solid
Total Amount Extracted	20.0 g	Dilution	NA
ICAL ID	U160719	Extracted	07/20/2016 16:00
CCal Filename(s)	U160723B_18 & U160724A_09	Analyzed	07/24/2016 10:51
Method Blank ID	BLANK-51144	Injected By	BAL

Native Isomers	**Qs** (ng)	**Qm** (ng)	% Rec.	**Internal Standards**	**ng's Added**	**Percent Recovery**
2,3,7,8-TCDF	0.20	0.22	110	2,3,7,8-TCDF-13C	2.0	66
Total TCDF				2,3,7,8-TCDD-13C	2.0	84
				1,2,3,7,8-PeCDF-13C	2.0	76
2,3,7,8-TCDD	0.20	0.16	79	2,3,4,7,8-PeCDF-13C	2.0	76
Total TCDD				1,2,3,7,8-PeCDD-13C	2.0	92
				1,2,3,4,7,8-HxCDF-13C	2.0	58
1,2,3,7,8-PeCDF	1.0	0.95	95	1,2,3,6,7,8-HxCDF-13C	2.0	68
2,3,4,7,8-PeCDF	1.0	1.1	106	2,3,4,6,7,8-HxCDF-13C	2.0	75
Total PeCDF				1,2,3,7,8,9-HxCDF-13C	2.0	73
				1,2,3,4,7,8-HxCDD-13C	2.0	75
1,2,3,7,8-PeCDD	1.0	0.90	90	1,2,3,6,7,8-HxCDD-13C	2.0	82
Total PeCDD				1,2,3,4,6,7,8-HpCDF-13C	2.0	78
				1,2,3,4,7,8,9-HpCDF-13C	2.0	75
1,2,3,4,7,8-HxCDF	1.0	1.0	102	1,2,3,4,6,7,8-HpCDD-13C	2.0	88
1,2,3,6,7,8-HxCDF	1.0	1.0	101	OCDD-13C	4.0	64
2,3,4,6,7,8-HxCDF	1.0	0.88	88			
1,2,3,7,8,9-HxCDF	1.0	0.92	92	1,2,3,4-TCDD-13C	2.0	NA
Total HxCDF				1,2,3,7,8,9-HxCDD-13C	2.0	NA
1,2,3,4,7,8-HxCDD	1.0	0.97	97	2,3,7,8-TCDD-37Cl4	0.20	77
1,2,3,6,7,8-HxCDD	1.0	1.1	107			
1,2,3,7,8,9-HxCDD	1.0	1.1	110			
Total HxCDD						
1,2,3,4,6,7,8-HpCDF	1.0	0.96	96			
1,2,3,4,7,8,9-HpCDF	1.0	0.91	91			
Total HpCDF						
1,2,3,4,6,7,8-HpCDD	1.0	0.98	98			
Total HpCDD						
OCDF	2.0	1.9	96			
OCDD	2.0	2.1	107			

Qs = Quantity Spiked
Qm = Quantity Measured
Rec. = Recovery (Expressed as Percent)
R = Recovery outside of target range

Y = RF averaging used in calculations
Nn = Value obtained from additional analysis
NA = Not Applicable
* = See Discussion

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Method 8290 Spiked Sample Report

Client - Veritech

Client's Sample ID	AC92394-001-MS		
Lab Sample ID	10355913001-MS		
Filename	U160725A_12	Matrix	Sediment
Total Amount Extracted	12.0 g	Dilution	NA
ICAL ID	U160719	Extracted	07/20/2016 16:00
CCal Filename(s)	U160724B_19 & U160725A_17	Analyzed	07/25/2016 19:05
Method Blank ID	BLANK-51144	Injected By	BAL

Native Isomers	Qs (ng)	Qm (ng)	% Rec.	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	0.20	0.27	134	2,3,7,8-TCDF-13C	2.00	83
				2,3,7,8-TCDD-13C	2.00	103
				1,2,3,7,8-PeCDF-13C	2.00	90
2,3,7,8-TCDD	0.20	0.17	87	2,3,4,7,8-PeCDF-13C	2.00	89
				1,2,3,7,8-PeCDD-13C	2.00	115
				1,2,3,4,7,8-HxCDF-13C	2.00	139 RY
1,2,3,7,8-PeCDF	1.00	1.04	104	1,2,3,6,7,8-HxCDF-13C	2.00	76
2,3,4,7,8-PeCDF	1.00	1.20	120	2,3,4,6,7,8-HxCDF-13C	2.00	81
				1,2,3,7,8,9-HxCDF-13C	2.00	77
				1,2,3,4,7,8-HxCDD-13C	2.00	105
1,2,3,7,8-PeCDD	1.00	0.93	93	1,2,3,6,7,8-HxCDD-13C	2.00	77
				1,2,3,4,6,7,8-HpCDF-13C	2.00	71
				1,2,3,4,7,8,9-HpCDF-13C	2.00	67
1,2,3,4,7,8-HxCDF	1.00	1.14	114	1,2,3,4,6,7,8-HpCDD-13C	2.00	85
1,2,3,6,7,8-HxCDF	1.00	1.06	106	OCDD-13C	4.00	62
2,3,4,6,7,8-HxCDF	1.00	0.99	99			
1,2,3,7,8,9-HxCDF	1.00	0.95	95	1,2,3,4-TCDD-13C	2.00	NA
				1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	1.00	1.04	104	2,3,7,8-TCDD-37Cl4	0.20	98
1,2,3,6,7,8-HxCDD	1.00	1.18	118			
1,2,3,7,8,9-HxCDD	1.00	0.97	97			
1,2,3,4,6,7,8-HpCDF	1.00	1.59	159			
1,2,3,4,7,8,9-HpCDF	1.00	1.04	104			
1,2,3,4,6,7,8-HpCDD	1.00	2.00	200			
OCDF	2.00	2.64	132			
OCDD	2.00	70.27	3514 E			

Qs = Quantity Spiked Qm = Quantity Measured Rec. = Recovery (Expressed as Percent)

Results reported on a dry weight basis and are valid to no more than 2 significant figures.
R = Recovery outside target range
E = Exceeds calibration range
Y = Calculated using average of daily RFs

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Method 8290 Spiked Sample Report

Client - Veritech

Client's Sample ID	AC92394-001-MSD		
Lab Sample ID	10355913001-MSD		
Filename	U160726A_03	Matrix	Sediment
Total Amount Extracted	12.0 g	Dilution	NA
ICAL ID	U160719	Extracted	07/20/2016 16:00
CCal Filename(s)	U160726A_02 & U160726A_19	Analyzed	07/26/2016 11:07
Method Blank ID	BLANK-51144	Injected By	SMT

Native Isomers	Qs (ng)	Qm (ng)	% Rec.	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	0.20	0.28	142	2,3,7,8-TCDF-13C	2.00	85
				2,3,7,8-TCDD-13C	2.00	105
				1,2,3,7,8-PeCDF-13C	2.00	83
2,3,7,8-TCDD	0.20	0.17	85	2,3,4,7,8-PeCDF-13C	2.00	82
				1,2,3,7,8-PeCDD-13C	2.00	101
				1,2,3,4,7,8-HxCDF-13C	2.00	84
1,2,3,7,8-PeCDF	1.00	0.94	94	1,2,3,6,7,8-HxCDF-13C	2.00	84
2,3,4,7,8-PeCDF	1.00	1.16	116	2,3,4,6,7,8-HxCDF-13C	2.00	87
				1,2,3,7,8,9-HxCDF-13C	2.00	70
				1,2,3,4,7,8-HxCDD-13C	2.00	102
1,2,3,7,8-PeCDD	1.00	0.90	90	1,2,3,6,7,8-HxCDD-13C	2.00	92
				1,2,3,4,6,7,8-HpCDF-13C	2.00	76
				1,2,3,4,7,8,9-HpCDF-13C	2.00	70
1,2,3,4,7,8-HxCDF	1.00	1.10	110	1,2,3,4,6,7,8-HpCDD-13C	2.00	88
1,2,3,6,7,8-HxCDF	1.00	1.02	102	OCDD-13C	4.00	62
2,3,4,6,7,8-HxCDF	1.00	1.01	101			
1,2,3,7,8,9-HxCDF	1.00	0.94	94	1,2,3,4-TCDD-13C	2.00	NA
				1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	1.00	1.00	100	2,3,7,8-TCDD-37Cl4	0.20	89
1,2,3,6,7,8-HxCDD	1.00	1.16	116			
1,2,3,7,8,9-HxCDD	1.00	1.00	100			
1,2,3,4,6,7,8-HpCDF	1.00	1.75	175			
1,2,3,4,7,8,9-HpCDF	1.00	0.99	99			
1,2,3,4,6,7,8-HpCDD	1.00	2.61	261			
OCDF	2.00	3.10	155			
OCDD	2.00	108.08	5404 E			

Qs = Quantity Spiked Qm = Quantity Measured Rec. = Recovery (Expressed as Percent)

Results reported on a dry weight basis and are valid to no more than 2 significant figures.
E = Exceeds calibration range

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Method 8290 Spike Sample Results

Client - Veritech

Client Sample ID	AC92394-001			Dry Weights	
Lab Sample ID	10355913001	Sample Filename	U160725A_11	Sample Amount	8.39 g
MS ID	10355913001-MS	MS Filename	U160725A_12	MS Amount	8.4 g
MSD ID	10355913001-MSD	MSD Filename	U160726A_03	MSD Amount	8.4 g

Analyte	Sample Conc. ng/Kg	MS/MSD Qs (ng)	MS Qm (ng)	MSD Qm (ng)	RPD	Background Subtracted MS % Rec.	MSD % Rec.	RPD
2,3,7,8-TCDF	8.264	0.20	0.27	0.28	5.3	100	107	7.1
2,3,7,8-TCDD	0.000	0.20	0.17	0.17	2.0	83	81	2.1
1,2,3,7,8-PeCDF	0.000	1.00	1.04	0.94	9.8	100	90	10.2
2,3,4,7,8-PeCDF	20.912	1.00	1.20	1.16	3.5	103	99	4.1
1,2,3,7,8-PeCDD	0.000	1.00	0.93	0.90	3.2	91	88	3.3
1,2,3,4,7,8-HxCDF	13.478	1.00	1.14	1.10	3.7	103	99	4.1
1,2,3,6,7,8-HxCDF	10.464	1.00	1.06	1.02	3.9	98	93	4.3
2,3,4,6,7,8-HxCDF	8.537	1.00	0.99	1.01	1.8	92	94	1.9
1,2,3,7,8,9-HxCDF	0.000	1.00	0.95	0.94	1.6	93	92	1.7
1,2,3,4,7,8-HxCDD	0.000	1.00	1.04	1.00	3.4	101	97	3.5
1,2,3,6,7,8-HxCDD	9.018	1.00	1.18	1.16	1.1	110	109	1.2
1,2,3,7,8,9-HxCDD	5.986	1.00	0.97	1.00	2.7	92	95	2.8
1,2,3,4,6,7,8-HpCDF	76.360	1.00	1.59	1.75	9.9	95	111	16.1
1,2,3,4,7,8,9-HpCDF	0.000	1.00	1.04	0.99	5.0	100	95	5.3
1,2,3,4,6,7,8-HpCDD	151.672	1.00	2.00	2.61	26.7	72	134	59.6
OCDF	115.617	2.00	2.64	3.10	16.2	83	107	24.5
OCDD	9693.629	2.00	70.27	108.08	42.4	0	1339	200.0

Definitions

MS = Matrix Spike
MSD = Matrix Spike Duplicate
Qm = Quantity Measured
Qs = Quantity Spiked
% Rec. = Percent Recovery
RPD = Relative Percent Difference
NA = Not Applicable
NC = Not Calculated

CDD = Chlorinated dibenzo-p-dioxin
CDF = Chlorinated dibenzo-p-furan
T = Tetra
Pe = Penta
Hx = Hexa
Hp = Hepta
O = Octa

Hampton-Clarke Report Of Analysis

Client: HDR
Project: Whale Creek

HC Project #: 6071513

Sample ID: B1
Lab#: AC92394-001
Matrix: Sediment

Collection Date: 7/14/2016
Receipt Date: 7/15/2016

% Solids SM2540G

Analyte	DF	Units	RL	Result
%Solids	**1**	**percent**		**71**

Mercury (Soil/Waste) 7471A

Analyte	DF	Units	RL	Result
Mercury	**1**	**mg/kg**	**0.12**	**0.26**

TAL Metals 6010

Analyte	DF	Units	RL	Result
Aluminum	**1**	**mg/kg**	**280**	**6700**
Barium	**1**	**mg/kg**	**14**	**21**
Calcium	1	mg/kg	1400	ND
Chromium	**1**	**mg/kg**	**7.0**	**54**
Cobalt	1	mg/kg	3.5	ND
Copper	**1**	**mg/kg**	**7.0**	**62**
Iron	**1**	**mg/kg**	**280**	**37000**
Lead	**1**	**mg/kg**	**7.0**	**320**
Magnesium	**1**	**mg/kg**	**700**	**2200**
Manganese	**1**	**mg/kg**	**14**	**120**
Nickel	**1**	**mg/kg**	**7.0**	**9.0**
Potassium	**1**	**mg/kg**	**700**	**860**
Sodium	**1**	**mg/kg**	**350**	**2000**
Vanadium	**1**	**mg/kg**	**14**	**55**
Zinc	**1**	**mg/kg**	**14**	**80**

TAL Metals 6020

Analyte	DF	Units	RL	Result
Antimony	1	mg/kg	1.1	ND
Arsenic	**1**	**mg/kg**	**0.28**	**15**
Beryllium	1	mg/kg	0.28	ND
Cadmium	1	mg/kg	0.56	ND
Selenium	1	mg/kg	2.8	ND
Silver	**1**	**mg/kg**	**0.28**	**0.31**
Thallium	1	mg/kg	0.56	ND

Sample ID: B2 (D) **Collection Date: 7/14/2016**
Lab#: AC92394-002 **Receipt Date: 7/15/2016**
Matrix: Sediment/Encore

% Solids SM2540G

Analyte	DF	Units	RL	Result
% Solids	**1**	**percent**		**23**

Cyanide (Soil/Waste) 9012B

Analyte	DF	Units	RL	Result
Cyanide	1	mg/kg	1.0	ND

Mercury (Soil/Waste) 7471A

Analyte	DF	Units	RL	Result
Mercury	**1**	**mg/kg**	**0.36**	**0.62**

Organochlorine Pesticides 8081

Analyte	DF	Units	RL	Result
a-Chlordane	**1**	**mg/kg**	**0.022**	**0.030**
Aldrin	1	mg/kg	0.022	ND
Alpha-BHC	1	mg/kg	0.0043	ND
beta-BHC	1	mg/kg	0.0043	ND
Chlordane (Total)	**1**	**mg/kg**	**0.022**	**0.030**
delta-BHC	1	mg/kg	0.022	ND
Dieldrin	**1**	**mg/kg**	**0.0043**	**0.0077d**
Endosulfan I	1	mg/kg	0.022	ND
Endosulfan II	1	mg/kg	0.022	ND
Endosulfan Sulfate	1	mg/kg	0.022	ND
Endrin	1	mg/kg	0.022	ND
Endrin Aldehyde	1	mg/kg	0.022	ND
Endrin Ketone	1	mg/kg	0.022	ND
gamma-BHC	1	mg/kg	0.0043	ND
Heptachlor	1	mg/kg	0.022	ND
Heptachlor Epoxide	1	mg/kg	0.022	ND
Methoxychlor	1	mg/kg	0.022	ND
p,p'-DDD	**1**	**mg/kg**	**0.011**	**0.10**
p,p'-DDE	**1**	**mg/kg**	**0.011**	**0.065**
p,p'-DDT	**1**	**mg/kg**	**0.011**	**0.056**
Toxaphene	1	mg/kg	0.11	ND
y-Chlordane	1	mg/kg	0.022	ND

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
TCMX-Surrogate	95.47	100	37	141	95	
TCMX-Surrogate	94.25	100	37	141	94	
DCB-Surrogate	79.21	100	33	146	79	
DCB-Surrogate	75.11	100	33	146	75	

PCB 8082

Analyte	DF	Units	RL	Result
Aroclor (Total)	1	mg/kg	0.11	ND
Aroclor-1016	1	mg/kg	0.11	ND
Aroclor-1221	1	mg/kg	0.11	ND
Aroclor-1232	1	mg/kg	0.11	ND
Aroclor-1242	1	mg/kg	0.11	ND
Aroclor-1248	1	mg/kg	0.11	ND
Aroclor-1254	1	mg/kg	0.11	ND
Aroclor-1260	1	mg/kg	0.11	ND
Aroclor-1262	1	mg/kg	0.11	ND
Aroclor-1268	1	mg/kg	0.11	ND

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
TCMX-Surrogate	101.02	100	37	141	101	
TCMX-Surrogate	99.42	100	37	141	99	
DCB-Surrogate	108.84	100	34	146	109	
DCB-Surrogate	97.43	100	34	146	97	

pH 9040C/9045D

Analyte	DF	Units	RL	Result
pH	**1**	**ph**		**6.4**

Sample ID: B2 (D) | **Collection Date: 7/14/2016**
Lab#: AC92394-002 | **Receipt Date: 7/15/2016**
Matrix: Sediment/Encore

Semivolatile Organics + 15 (8270)

Analyte	DF	Units	RL	Result
1,1'-Biphenyl	1	mg/kg	0.14	ND
1,2,4,5-Tetrachlorobenzene	1	mg/kg	0.14	ND
2,3,4,6-Tetrachlorophenol	1	mg/kg	0.14	ND
2,4,5-Trichlorophenol	1	mg/kg	0.14	ND
2,4,6-Trichlorophenol	1	mg/kg	0.14	ND
2,4-Dichlorophenol	1	mg/kg	0.036	ND
2,4-Dimethylphenol	1	mg/kg	0.036	ND
2,4-Dinitrophenol	1	mg/kg	0.72	ND
2,4-Dinitrotoluene	1	mg/kg	0.14	ND
2,6-Dinitrotoluene	1	mg/kg	0.14	ND
2-Chloronaphthalene	1	mg/kg	0.14	ND
2-Chlorophenol	1	mg/kg	0.14	ND
2-Methylnaphthalene	1	mg/kg	0.14	ND
2-Methylphenol	1	mg/kg	0.036	ND
2-Nitroaniline	1	mg/kg	0.14	ND
2-Nitrophenol	1	mg/kg	0.14	ND
3&4-Methylphenol	1	mg/kg	0.036	ND
3,3'-Dichlorobenzidine	1	mg/kg	0.14	ND
3-Nitroaniline	1	mg/kg	0.14	ND
4,6-Dinitro-2-methylphenol	1	mg/kg	0.72	ND
4-Bromophenyl-phenylether	1	mg/kg	0.14	ND
4-Chloro-3-methylphenol	1	mg/kg	0.14	ND
4-Chloroaniline	1	mg/kg	0.036	ND
4-Chlorophenyl-phenylether	1	mg/kg	0.14	ND
4-Nitroaniline	1	mg/kg	0.14	ND
4-Nitrophenol	1	mg/kg	0.14	ND
Acenaphthene	1	mg/kg	0.14	ND
Acenaphthylene	1	mg/kg	0.14	ND
Acetophenone	1	mg/kg	0.14	ND
Anthracene	1	mg/kg	0.14	ND
Atrazine	1	mg/kg	0.14	ND
Benzaldehyde	1	mg/kg	0.14	ND
Benzo[a]anthracene	**1**	**mg/kg**	**0.14**	**0.22**
Benzo[a]pyrene	**1**	**mg/kg**	**0.14**	**0.27**
Benzo[b]fluoranthene	**1**	**mg/kg**	**0.14**	**0.35**
Benzo[g,h,i]perylene	**1**	**mg/kg**	**0.14**	**0.24**
Benzo[k]fluoranthene	1	mg/kg	0.14	ND
bis(2-Chloroethoxy)methane	1	mg/kg	0.14	ND
bis(2-Chloroethyl)ether	1	mg/kg	0.036	ND
bis(2-Chloroisopropyl)ether	1	mg/kg	0.14	ND
bis(2-Ethylhexyl)phthalate	1	mg/kg	0.14	ND
Butylbenzylphthalate	1	mg/kg	0.14	ND
Caprolactam	1	mg/kg	0.14	ND
Carbazole	1	mg/kg	0.14	ND
Chrysene	**1**	**mg/kg**	**0.14**	**0.30**
Dibenzo[a,h]anthracene	1	mg/kg	0.14	ND
Dibenzofuran	1	mg/kg	0.036	ND
Diethylphthalate	1	mg/kg	0.14	ND
Dimethylphthalate	1	mg/kg	0.14	ND
Di-n-butylphthalate	1	mg/kg	0.036	ND
Di-n-octylphthalate	1	mg/kg	0.14	ND
Fluoranthene	**1**	**mg/kg**	**0.14**	**0.35**
Fluorene	1	mg/kg	0.14	ND
Hexachlorobenzene	1	mg/kg	0.14	ND
Hexachlorobutadiene	1	mg/kg	0.14	ND
Hexachlorocyclopentadiene	1	mg/kg	0.28	ND
Hexachloroethane	1	mg/kg	0.14	ND
Indeno[1,2,3-cd]pyrene	**1**	**mg/kg**	**0.14**	**0.17**
Isophorone	1	mg/kg	0.14	ND
Naphthalene	**1**	**mg/kg**	**0.036**	**0.065**
Nitrobenzene	1	mg/kg	0.14	ND
N-Nitroso-di-n-propylamine	1	mg/kg	0.036	ND
N-Nitrosodiphenylamine	1	mg/kg	0.14	ND
Pentachlorophenol	1	mg/kg	0.72	ND
Phenanthrene	**1**	**mg/kg**	**0.14**	**0.22**
Phenol	1	mg/kg	0.14	ND

Sample ID: B2 (D) **Collection Date: 7/14/2016**
Lab#: AC92394-002 **Receipt Date: 7/15/2016**
Matrix: Sediment/Encore

Pyrene	**1**	**mg/kg**	**0.14**		**0.59**

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
Terphenyl-d14	50.82	50	58	148	102	
Phenol-d5	71.45	100	49	129	71	
Nitrobenzene-d5	32.44	50	52	129	65	
2-Fluorophenol	65.59	100	43	128	66	
2-Fluorobiphenyl	34.38	50	58	125	69	
2,4,6-Tribromophenol	84.35	100	54	145	84	

Semivolatile Organics + 15 (8270) Library Searches

Analyte	DF	Units	RT	Result
unknown	**1**	**mg/kg**	**12.34**	**0.38J**
Octadecanal	**1**	**mg/kg**	**12.48**	**0.33J**
Tetradecanal	**1**	**mg/kg**	**13.28**	**0.50J**
unknown	**1**	**mg/kg**	**15.99**	**0.54J**
unknown	**1**	**mg/kg**	**16.19**	**1.3J**
unknown	**1**	**mg/kg**	**16.5**	**2.2J**
Propanoic acid	**1**	**mg/kg**	**2.58**	**3.0J**
Propanoic acid, 2-methyl-	**1**	**mg/kg**	**3.45**	**0.91J**
2-Pentene, 2,3-dimethyl-	**1**	**mg/kg**	**3.86**	**0.43J**
unknown	**1**	**mg/kg**	**4.12**	**12JB**
Butanoic acid	**1**	**mg/kg**	**4.29**	**14J**
2-Pentanone, 4-hydroxy-4-methyl-	**1**	**mg/kg**	**4.45**	**230JAB**
Butanoic acid, 2-methyl-	**1**	**mg/kg**	**4.49**	**0.33J**
Butanoic acid	**1**	**mg/kg**	**4.78**	**0.47J**
unknown	**1**	**mg/kg**	**5.1**	**2.7JB**
TotalSemiVolatileTic	**1**	**mg/kg**	**NA**	**270J**

TAL Metals 6010

Analyte	DF	Units	RL	Result
Aluminum	**1**	**mg/kg**	**870**	**16000**
Barium	1	mg/kg	43	ND
Calcium	1	mg/kg	4300	ND
Chromium	**1**	**mg/kg**	**22**	**180**
Cobalt	**1**	**mg/kg**	**11**	**12**
Copper	**1**	**mg/kg**	**22**	**93**
Iron	**1**	**mg/kg**	**870**	**41000**
Lead	**1**	**mg/kg**	**22**	**150**
Magnesium	**1**	**mg/kg**	**2200**	**5700**
Manganese	**1**	**mg/kg**	**43**	**99**
Nickel	**1**	**mg/kg**	**22**	**32**
Potassium	1	mg/kg	2200	ND
Sodium	**1**	**mg/kg**	**1100**	**25000**
Vanadium	**1**	**mg/kg**	**43**	**53**
Zinc	**1**	**mg/kg**	**43**	**150**

TAL Metals 6020

Analyte	DF	Units	RL	Result
Antimony	1	mg/kg	3.5	ND
Arsenic	**1**	**mg/kg**	**0.87**	**33**
Beryllium	**1**	**mg/kg**	**0.87**	**1.3**
Cadmium	1	mg/kg	1.7	ND
Selenium	**1**	**mg/kg**	**8.7**	**9.9**
Silver	1	mg/kg	0.87	ND
Thallium	1	mg/kg	1.7	ND

TOC (Region II/Kahn)

Analyte	DF	Units	RL	Result
Total Organic Carbon	**1**	**mg/kg**	**5700**	**130000**

Volatile Organics + 15 (8260)

Analyte	DF	Units	RL	Result
1,1,1-Trichloroethane	1.65	mg/kg	0.014	ND
1,1,2,2-Tetrachloroethane	1.65	mg/kg	0.014	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	1.65	mg/kg	0.014	ND
1,1,2-Trichloroethane	1.65	mg/kg	0.014	ND
1,1-Dichloroethane	1.65	mg/kg	0.014	ND

Sample ID: B2 (D) **Collection Date: 7/14/2016**
Lab#: AC92394-002 **Receipt Date: 7/15/2016**
Matrix: Sediment/Encore

1,1-Dichloroethene	1.65	mg/kg	0.014	ND
1,2,3-Trichlorobenzene	1.65	mg/kg	0.014	ND
1,2,4-Trichlorobenzene	1.65	mg/kg	0.014	ND
1,2-Dibromo-3-chloropropane	1.65	mg/kg	0.014	ND
1,2-Dibromoethane	1.65	mg/kg	0.0072	ND
1,2-Dichlorobenzene	1.65	mg/kg	0.014	ND
1,2-Dichloroethane	1.65	mg/kg	0.014	ND
1,2-Dichloropropane	1.65	mg/kg	0.014	ND
1,3-Dichlorobenzene	1.65	mg/kg	0.014	ND
1,4-Dichlorobenzene	1.65	mg/kg	0.014	ND
1,4-Dioxane	1.65	mg/kg	0.72	ND
2-Butanone	1.65	mg/kg	0.014	ND
2-Hexanone	1.65	mg/kg	0.014	ND
4-Methyl-2-pentanone	1.65	mg/kg	0.014	ND
Acetone	1.65	mg/kg	0.072	ND
Benzene	1.65	mg/kg	0.0072	ND
Bromochloromethane	1.65	mg/kg	0.014	ND
Bromodichloromethane	1.65	mg/kg	0.014	ND
Bromoform	1.65	mg/kg	0.014	ND
Bromomethane	1.65	mg/kg	0.014	ND
Carbon disulfide	**1.65**	**mg/kg**	**0.014**	**0.024**
Carbon tetrachloride	1.65	mg/kg	0.014	ND
Chlorobenzene	1.65	mg/kg	0.014	ND
Chloroethane	1.65	mg/kg	0.014	ND
Chloroform	1.65	mg/kg	0.014	ND
Chloromethane	1.65	mg/kg	0.014	ND
cis-1,2-Dichloroethene	1.65	mg/kg	0.014	ND
cis-1,3-Dichloropropene	1.65	mg/kg	0.014	ND
Cyclohexane	1.65	mg/kg	0.014	ND
Dibromochloromethane	1.65	mg/kg	0.014	ND
Dichlorodifluoromethane	1.65	mg/kg	0.014	ND
Ethylbenzene	1.65	mg/kg	0.0072	ND
Isopropylbenzene	1.65	mg/kg	0.0072	ND
m&p-Xylenes	1.65	mg/kg	0.0072	ND
Methyl Acetate	1.65	mg/kg	0.014	ND
Methylcyclohexane	1.65	mg/kg	0.014	ND
Methylene chloride	1.65	mg/kg	0.014	ND
Methyl-t-butyl ether	1.65	mg/kg	0.0072	ND
o-Xylene	1.65	mg/kg	0.0072	ND
Styrene	1.65	mg/kg	0.014	ND
Tetrachloroethene	1.65	mg/kg	0.014	ND
Toluene	1.65	mg/kg	0.0072	ND
trans-1,2-Dichloroethene	1.65	mg/kg	0.014	ND
trans-1,3-Dichloropropene	1.65	mg/kg	0.014	ND
Trichloroethene	1.65	mg/kg	0.014	ND
Trichlorofluoromethane	1.65	mg/kg	0.014	ND
Vinyl chloride	1.65	mg/kg	0.014	ND
Xylenes (Total)	1.65	mg/kg	0.0072	ND

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
Toluene-d8	26.21	30	68	122	87	
Dibromofluoromethane	32.58	30	63	140	109	
Bromofluorobenzene	30.00	30	64	129	100	
1,2-Dichloroethane-d4	31.84	30	63	143	106	

Volatile Organics + 15 (8260) Library Searches

Analyte	DF	Units	RT	Result
unknown	**1.65**	**mg/kg**	**2.85**	**0.13J**
unknown	**1.65**	**mg/kg**	**5.9**	**0.036J**
TotalVolatileTic	**1.65**	**mg/kg**	**NA**	**0.17J**

Sample ID: B3 | **Collection Date: 7/14/2016**
Lab#: AC92394-003 | **Receipt Date: 7/15/2016**
Matrix: Sediment

% Solids SM2540G

Analyte	DF	Units	RL	Result
%Solids	**1**	**percent**		**12**

Mercury (Soil/Waste) 7471A

Analyte	DF	Units	RL	Result
Mercury	**1**	**mg/kg**	**0.69**	**0.75**

TAL Metals 6010

Analyte	DF	Units	RL	Result
Aluminum	**1**	**mg/kg**	**1700**	**29000**
Barium	1	mg/kg	83	ND
Calcium	1	mg/kg	8300	ND
Chromium	**1**	**mg/kg**	**42**	**140**
Cobalt	**1**	**mg/kg**	**21**	**54**
Copper	**1**	**mg/kg**	**42**	**110**
Iron	**1**	**mg/kg**	**1700**	**61000**
Lead	**1**	**mg/kg**	**42**	**110**
Magnesium	**1**	**mg/kg**	**4200**	**12000**
Manganese	**1**	**mg/kg**	**83**	**1200**
Nickel	**1**	**mg/kg**	**42**	**68**
Potassium	**1**	**mg/kg**	**4200**	**4300**
Sodium	**1**	**mg/kg**	**2100**	**55000**
Vanadium	1	mg/kg	83	ND
Zinc	**1**	**mg/kg**	**83**	**540**

TAL Metals 6020

Analyte	DF	Units	RL	Result
Antimony	1	mg/kg	6.7	ND
Arsenic	**1**	**mg/kg**	**1.7**	**20**
Beryllium	**1**	**mg/kg**	**1.7**	**2.7**
Cadmium	1	mg/kg	3.3	ND
Selenium	1	mg/kg	17	ND
Silver	1	mg/kg	1.7	ND
Thallium	1	mg/kg	3.3	ND

Sample ID: B4 (D) | **Collection Date: 7/14/2016**
Lab#: AC92394-004 | **Receipt Date: 7/15/2016**
Matrix: Sediment

% Solids SM2540G

Analyte	DF	Units	RL	Result
% Solids	**1**	**percent**		**16**

Mercury (Soil/Waste) 7471A

Analyte	DF	Units	RL	Result
Mercury	**1**	**mg/kg**	**0.52**	**1.7**

TAL Metals 6010

Analyte	DF	Units	RL	Result
Aluminum	**1**	**mg/kg**	**1200**	**31000**
Barium	**1**	**mg/kg**	**62**	**72**
Calcium	1	mg/kg	6200	ND
Chromium	**1**	**mg/kg**	**31**	**1400**
Cobalt	**1**	**mg/kg**	**16**	**21**
Copper	**1**	**mg/kg**	**31**	**200**
Iron	**1**	**mg/kg**	**1200**	**110000**
Lead	**1**	**mg/kg**	**31**	**210**
Magnesium	**1**	**mg/kg**	**3100**	**13000**
Manganese	**1**	**mg/kg**	**62**	**620**
Nickel	**1**	**mg/kg**	**31**	**56**
Potassium	**1**	**mg/kg**	**3100**	**4300**
Sodium	**1**	**mg/kg**	**1600**	**50000**
Vanadium	**1**	**mg/kg**	**62**	**96**
Zinc	**1**	**mg/kg**	**62**	**220**

TAL Metals 6020

Analyte	DF	Units	RL	Result
Antimony	**1**	**mg/kg**	**5.0**	**7.7**
Arsenic	**1**	**mg/kg**	**1.2**	**89**
Beryllium	**2**	**mg/kg**	**2.5**	**2.5**
Cadmium	1	mg/kg	2.5	ND
Selenium	**1**	**mg/kg**	**13**	**19**
Silver	1	mg/kg	1.2	ND
Thallium	1	mg/kg	2.5	ND

Sample ID: B5 | **Collection Date: 7/14/2016**
Lab#: AC92394-005 | **Receipt Date: 7/15/2016**
Matrix: Sediment

% Solids SM2540G

Analyte	DF	Units	RL	Result
%Solids	**1**	**percent**		**13**

Mercury (Soil/Waste) 7471A

Analyte	DF	Units	RL	Result
Mercury	1	mg/kg	0.64	ND

TAL Metals 6010

Analyte	DF	Units	RL	Result
Aluminum	**1**	**mg/kg**	**1500**	**18000**
Barium	1	mg/kg	77	ND
Calcium	**1**	**mg/kg**	**7700**	**8900**
Chromium	**1**	**mg/kg**	**38**	**52**
Cobalt	**1**	**mg/kg**	**19**	**49**
Copper	**1**	**mg/kg**	**38**	**86**
Iron	**1**	**mg/kg**	**1500**	**43000**
Lead	**1**	**mg/kg**	**38**	**76**
Magnesium	**1**	**mg/kg**	**3800**	**14000**
Manganese	**1**	**mg/kg**	**77**	**5800**
Nickel	**1**	**mg/kg**	**38**	**59**
Potassium	**1**	**mg/kg**	**3800**	**5600**
Sodium	**1**	**mg/kg**	**1900**	**67000**
Vanadium	1	mg/kg	77	ND
Zinc	**1**	**mg/kg**	**77**	**270**

TAL Metals 6020

Analyte	DF	Units	RL	Result
Antimony	1	mg/kg	6.2	ND
Arsenic	**1**	**mg/kg**	**1.5**	**110**
Beryllium	**2**	**mg/kg**	**3.1**	**5.8**
Cadmium	1	mg/kg	3.1	ND
Selenium	**1**	**mg/kg**	**15**	**26**
Silver	**1**	**mg/kg**	**1.5**	**4.4**
Thallium	1	mg/kg	3.1	ND

Sample ID: B6 | **Collection Date: 7/14/2016**
Lab#: AC92394-006 | **Receipt Date: 7/15/2016**
Matrix: Sediment

% Solids SM2540G

Analyte	DF	Units	RL	Result
%Solids	**1**	**percent**		**22**

Mercury (Soil/Waste) 7471A

Analyte	DF	Units	RL	Result
Mercury	**1**	**mg/kg**	**0.38**	**1.2**

TAL Metals 6010

Analyte	DF	Units	RL	Result
Aluminum	**1**	**mg/kg**	**910**	**44000**
Barium	**1**	**mg/kg**	**45**	**82**
Calcium	**1**	**mg/kg**	**4500**	**6300**
Chromium	**1**	**mg/kg**	**23**	**410**
Cobalt	**1**	**mg/kg**	**11**	**110**
Copper	**1**	**mg/kg**	**23**	**150**
Iron	**1**	**mg/kg**	**910**	**100000**
Lead	**1**	**mg/kg**	**23**	**180**
Magnesium	**1**	**mg/kg**	**2300**	**12000**
Manganese	**1**	**mg/kg**	**45**	**5400**
Nickel	**1**	**mg/kg**	**23**	**110**
Potassium	**1**	**mg/kg**	**2300**	**4100**
Sodium	**1**	**mg/kg**	**1100**	**36000**
Vanadium	**1**	**mg/kg**	**45**	**110**
Zinc	**1**	**mg/kg**	**45**	**620**

TAL Metals 6020

Analyte	DF	Units	RL	Result
Antimony	1	mg/kg	3.6	ND
Arsenic	**1**	**mg/kg**	**0.91**	**81**
Beryllium	**2**	**mg/kg**	**1.8**	**4.5**
Cadmium	1	mg/kg	1.8	ND
Selenium	**1**	**mg/kg**	**9.1**	**17**
Silver	**1**	**mg/kg**	**0.91**	**0.98**
Thallium	1	mg/kg	1.8	ND

Sample ID: B7 | **Collection Date: 7/14/2016**
Lab#: AC92394-007 | **Receipt Date: 7/15/2016**
Matrix: Sediment

% Solids SM2540G

Analyte	DF	Units	RL	Result
%Solids	**1**	**percent**		**17**

Mercury (Soil/Waste) 7471A

Analyte	DF	Units	RL	Result
Mercury	1	mg/kg	0.49	ND

TAL Metals 6010

Analyte	DF	Units	RL	Result
Aluminum	**1**	**mg/kg**	**1200**	**17000**
Barium	1	mg/kg	59	ND
Calcium	1	mg/kg	5900	ND
Chromium	**1**	**mg/kg**	**29**	**64**
Cobalt	**1**	**mg/kg**	**15**	**56**
Copper	**1**	**mg/kg**	**29**	**79**
Iron	**1**	**mg/kg**	**1200**	**28000**
Lead	**1**	**mg/kg**	**29**	**85**
Magnesium	**1**	**mg/kg**	**2900**	**9300**
Manganese	**1**	**mg/kg**	**59**	**680**
Nickel	**1**	**mg/kg**	**29**	**69**
Potassium	**1**	**mg/kg**	**2900**	**3200**
Sodium	**1**	**mg/kg**	**1500**	**42000**
Vanadium	**1**	**mg/kg**	**59**	**66**
Zinc	**1**	**mg/kg**	**59**	**370**

TAL Metals 6020

Analyte	DF	Units	RL	Result
Antimony	1	mg/kg	4.7	ND
Arsenic	**1**	**mg/kg**	**1.2**	**37**
Beryllium	**1**	**mg/kg**	**1.2**	**3.1**
Cadmium	1	mg/kg	2.4	ND
Selenium	1	mg/kg	12	ND
Silver	1	mg/kg	1.2	ND
Thallium	1	mg/kg	2.4	ND

Sample ID: B8 (D) **Collection Date: 7/14/2016**
Lab#: AC92394-008 **Receipt Date: 7/15/2016**
Matrix: Sediment

% Solids SM2540G

Analyte	DF	Units	RL	Result
%Solids	**1**	**percent**		**23**

Mercury (Soil/Waste) 7471A

Analyte	DF	Units	RL	Result
Mercury	**1**	**mg/kg**	**0.36**	**1.4**

TAL Metals 6010

Analyte	DF	Units	RL	Result
Aluminum	**1**	**mg/kg**	**870**	**45000**
Barium	**1**	**mg/kg**	**43**	**67**
Calcium	**1**	**mg/kg**	**4300**	**5500**
Chromium	**1**	**mg/kg**	**22**	**230**
Cobalt	**1**	**mg/kg**	**11**	**36**
Copper	**1**	**mg/kg**	**22**	**200**
Iron	**1**	**mg/kg**	**870**	**73000**
Lead	**1**	**mg/kg**	**22**	**430**
Magnesium	**1**	**mg/kg**	**2200**	**10000**
Manganese	**1**	**mg/kg**	**43**	**260**
Nickel	**1**	**mg/kg**	**22**	**80**
Potassium	**1**	**mg/kg**	**2200**	**3800**
Sodium	**1**	**mg/kg**	**1100**	**35000**
Vanadium	**1**	**mg/kg**	**43**	**98**
Zinc	**1**	**mg/kg**	**43**	**560**

TAL Metals 6020

Analyte	DF	Units	RL	Result
Antimony	1	mg/kg	3.5	ND
Arsenic	**1**	**mg/kg**	**0.87**	**1.1**
Beryllium	**1**	**mg/kg**	**0.87**	**1.7**
Cadmium	1	mg/kg	1.7	ND
Selenium	**1**	**mg/kg**	**8.7**	**9.4**
Silver	1	mg/kg	0.87	ND
Thallium	1	mg/kg	1.7	ND

Sample ID: B9 | **Collection Date: 7/14/2016**
Lab#: AC92394-009 | **Receipt Date: 7/15/2016**
Matrix: Sediment

% Solids SM2540G

Analyte	DF	Units	RL	Result
%Solids	**1**	**percent**		**24**

Mercury (Soil/Waste) 7471A

Analyte	DF	Units	RL	Result
Mercury	**1**	**mg/kg**	**0.35**	**1.2**

TAL Metals 6010

Analyte	DF	Units	RL	Result
Aluminum	**1**	**mg/kg**	**830**	**20000**
Barium	1	mg/kg	42	ND
Calcium	**1**	**mg/kg**	**4200**	**7200**
Chromium	**1**	**mg/kg**	**21**	**68**
Cobalt	**1**	**mg/kg**	**10**	**18**
Copper	**1**	**mg/kg**	**21**	**83**
Iron	**1**	**mg/kg**	**830**	**44000**
Lead	**1**	**mg/kg**	**21**	**110**
Magnesium	**1**	**mg/kg**	**2100**	**10000**
Manganese	**1**	**mg/kg**	**42**	**410**
Nickel	**1**	**mg/kg**	**21**	**38**
Potassium	**1**	**mg/kg**	**2100**	**4000**
Sodium	**1**	**mg/kg**	**1000**	**35000**
Vanadium	**1**	**mg/kg**	**42**	**67**
Zinc	**1**	**mg/kg**	**42**	**250**

TAL Metals 6020

Analyte	DF	Units	RL	Result
Antimony	1	mg/kg	3.3	ND
Arsenic	**1**	**mg/kg**	**0.83**	**57**
Beryllium	**1**	**mg/kg**	**0.83**	**2.5**
Cadmium	1	mg/kg	1.7	ND
Selenium	**1**	**mg/kg**	**8.3**	**11**
Silver	**1**	**mg/kg**	**0.83**	**1.1**
Thallium	1	mg/kg	1.7	ND

Sample ID: B10 | **Collection Date: 7/14/2016**
Lab#: AC92394-010 | **Receipt Date: 7/15/2016**
Matrix: Sediment

% Solids SM2540G

Analyte	DF	Units	RL	Result
%Solids	**1**	**percent**		**31**

Mercury (Soil/Waste) 7471A

Analyte	DF	Units	RL	Result
Mercury	**1**	**mg/kg**	**0.27**	**1.9**

TAL Metals 6010

Analyte	DF	Units	RL	Result
Aluminum	**1**	**mg/kg**	**650**	**36000**
Barium	**1**	**mg/kg**	**32**	**89**
Calcium	**1**	**mg/kg**	**3200**	**14000**
Chromium	**1**	**mg/kg**	**16**	**290**
Cobalt	**1**	**mg/kg**	**8.1**	**24**
Copper	**1**	**mg/kg**	**16**	**170**
Iron	**1**	**mg/kg**	**650**	**65000**
Lead	**1**	**mg/kg**	**16**	**230**
Magnesium	**1**	**mg/kg**	**1600**	**13000**
Manganese	**1**	**mg/kg**	**32**	**350**
Nickel	**1**	**mg/kg**	**16**	**62**
Potassium	**1**	**mg/kg**	**1600**	**5700**
Sodium	**1**	**mg/kg**	**810**	**31000**
Vanadium	**1**	**mg/kg**	**32**	**120**
Zinc	**1**	**mg/kg**	**32**	**420**

TAL Metals 6020

Analyte	DF	Units	RL	Result
Antimony	1	mg/kg	2.6	ND
Arsenic	**1**	**mg/kg**	**0.65**	**13**
Beryllium	**1**	**mg/kg**	**0.65**	**0.98**
Cadmium	1	mg/kg	1.3	ND
Selenium	1	mg/kg	6.5	ND
Silver	1	mg/kg	0.65	ND
Thallium	1	mg/kg	1.3	ND

Sample ID: B11 **Collection Date:** 7/14/2016
Lab#: AC92394-011 **Receipt Date:** 7/15/2016
Matrix: Sediment

% Solids SM2540G

Analyte	DF	Units	RL	Result
%Solids	**1**	**percent**		**42**

Mercury (Soil/Waste) 7471A

Analyte	DF	Units	RL	Result
Mercury	**1**	**mg/kg**	**0.20**	**1.6**

TAL Metals 6010

Analyte	DF	Units	RL	Result
Aluminum	**1**	**mg/kg**	**480**	**26000**
Barium	**1**	**mg/kg**	**24**	**64**
Calcium	**1**	**mg/kg**	**2400**	**2800**
Chromium	**1**	**mg/kg**	**12**	**210**
Cobalt	**1**	**mg/kg**	**6.0**	**16**
Copper	**1**	**mg/kg**	**12**	**130**
Iron	**1**	**mg/kg**	**480**	**64000**
Lead	**1**	**mg/kg**	**12**	**160**
Magnesium	**1**	**mg/kg**	**1200**	**9200**
Manganese	**1**	**mg/kg**	**24**	**390**
Nickel	**1**	**mg/kg**	**12**	**38**
Potassium	**1**	**mg/kg**	**1200**	**4100**
Sodium	**1**	**mg/kg**	**600**	**16000**
Vanadium	**1**	**mg/kg**	**24**	**89**
Zinc	**1**	**mg/kg**	**24**	**320**

TAL Metals 6020

Analyte	DF	Units	RL	Result
Antimony	1	mg/kg	1.9	ND
Arsenic	**1**	**mg/kg**	**0.48**	**43**
Beryllium	**2**	**mg/kg**	**0.95**	**1.7**
Cadmium	1	mg/kg	0.95	ND
Selenium	**1**	**mg/kg**	**4.8**	**7.9**
Silver	**1**	**mg/kg**	**0.48**	**1.3**
Thallium	1	mg/kg	0.95	ND

Sample ID: B12 | **Collection Date: 7/14/2016**
Lab#: AC92394-012 | **Receipt Date: 7/15/2016**
Matrix: Sediment/Encore

% Solids SM2540G

Analyte	DF	Units	RL	Result
% Solids	**1**	**percent**		**42**

Cyanide (Soil/Waste) 9012B

Analyte	DF	Units	RL	Result
Cyanide	1	mg/kg	0.57	ND

Mercury (Soil/Waste) 7471A

Analyte	DF	Units	RL	Result
Mercury	**1**	**mg/kg**	**0.20**	**2.0**

Organochlorine Pesticides 8081

Analyte	DF	Units	RL	Result
a-Chlordane	1	mg/kg	0.012	ND
Aldrin	1	mg/kg	0.012	ND
Alpha-BHC	1	mg/kg	0.0024	ND
beta-BHC	1	mg/kg	0.0024	ND
Chlordane (Total)	1	mg/kg	0.012	ND
delta-BHC	1	mg/kg	0.012	ND
Dieldrin	1	mg/kg	0.0024	ND
Endosulfan I	1	mg/kg	0.012	ND
Endosulfan II	1	mg/kg	0.012	ND
Endosulfan Sulfate	1	mg/kg	0.012	ND
Endrin	1	mg/kg	0.012	ND
Endrin Aldehyde	1	mg/kg	0.012	ND
Endrin Ketone	1	mg/kg	0.012	ND
gamma-BHC	1	mg/kg	0.0024	ND
Heptachlor	1	mg/kg	0.012	ND
Heptachlor Epoxide	1	mg/kg	0.012	ND
Methoxychlor	1	mg/kg	0.012	ND
p,p'-DDD	1	mg/kg	0.0060	ND
p,p'-DDE	1	mg/kg	0.0060	ND
p,p'-DDT	1	mg/kg	0.0060	ND
Toxaphene	1	mg/kg	0.060	ND
y-Chlordane	1	mg/kg	0.012	ND

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
TCMX-Surrogate	96.59	100	37	141	97	
TCMX-Surrogate	91.32	100	37	141	91	
DCB-Surrogate	73.86	100	33	146	74	
DCB-Surrogate	72.19	100	33	146	72	

PCB 8082

Analyte	DF	Units	RL	Result
Aroclor (Total)	**1**	**mg/kg**	**0.060**	**0.098**
Aroclor-1016	1	mg/kg	0.060	ND
Aroclor-1221	1	mg/kg	0.060	ND
Aroclor-1232	1	mg/kg	0.060	ND
Aroclor-1242	1	mg/kg	0.060	ND
Aroclor-1248	1	mg/kg	0.060	ND
Aroclor-1254	**1**	**mg/kg**	**0.060**	**0.098**
Aroclor-1260	1	mg/kg	0.060	ND
Aroclor-1262	1	mg/kg	0.060	ND
Aroclor-1268	1	mg/kg	0.060	ND

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
TCMX-Surrogate	113.28	100	37	141	113	
TCMX-Surrogate	119.56	100	37	141	120	
DCB-Surrogate	148.24	100	34	146	148	S8
DCB-Surrogate	118.29	100	34	146	118	

pH 9040C/9045D

Analyte	DF	Units	RL	Result
pH	**1**	**ph**		**6.7**

Sample ID: B12 **Collection Date: 7/14/2016**
Lab#: AC92394-012 **Receipt Date: 7/15/2016**
Matrix: Sediment/Encore

Semivolatile Organics + 15 (8270)

Analyte	DF	Units	RL	Result
1,1'-Biphenyl	1	mg/kg	0.079	ND
1,2,4,5-Tetrachlorobenzene	1	mg/kg	0.079	ND
2,3,4,6-Tetrachlorophenol	1	mg/kg	0.079	ND
2,4,5-Trichlorophenol	1	mg/kg	0.079	ND
2,4,6-Trichlorophenol	1	mg/kg	0.079	ND
2,4-Dichlorophenol	1	mg/kg	0.020	ND
2,4-Dimethylphenol	1	mg/kg	0.020	ND
2,4-Dinitrophenol	1	mg/kg	0.40	ND
2,4-Dinitrotoluene	1	mg/kg	0.079	ND
2,6-Dinitrotoluene	1	mg/kg	0.079	ND
2-Chloronaphthalene	1	mg/kg	0.079	ND
2-Chlorophenol	1	mg/kg	0.079	ND
2-Methylnaphthalene	1	mg/kg	0.079	ND
2-Methylphenol	1	mg/kg	0.020	ND
2-Nitroaniline	1	mg/kg	0.079	ND
2-Nitrophenol	1	mg/kg	0.079	ND
3&4-Methylphenol	1	mg/kg	0.020	ND
3,3'-Dichlorobenzidine	1	mg/kg	0.079	ND
3-Nitroaniline	1	mg/kg	0.079	ND
4,6-Dinitro-2-methylphenol	1	mg/kg	0.40	ND
4-Bromophenyl-phenylether	1	mg/kg	0.079	ND
4-Chloro-3-methylphenol	1	mg/kg	0.079	ND
4-Chloroaniline	1	mg/kg	0.020	ND
4-Chlorophenyl-phenylether	1	mg/kg	0.079	ND
4-Nitroaniline	1	mg/kg	0.079	ND
4-Nitrophenol	1	mg/kg	0.079	ND
Acenaphthene	1	mg/kg	0.079	ND
Acenaphthylene	1	mg/kg	0.079	ND
Acetophenone	1	mg/kg	0.079	ND
Anthracene	1	mg/kg	0.079	ND
Atrazine	1	mg/kg	0.079	ND
Benzaldehyde	1	mg/kg	0.079	ND
Benzo[a]anthracene	1	mg/kg	0.079	ND
Benzo[a]pyrene	1	mg/kg	0.079	ND
Benzo[b]fluoranthene	1	mg/kg	0.079	ND
Benzo[g,h,i]perylene	1	mg/kg	0.079	ND
Benzo[k]fluoranthene	1	mg/kg	0.079	ND
bis(2-Chloroethoxy)methane	1	mg/kg	0.079	ND
bis(2-Chloroethyl)ether	1	mg/kg	0.020	ND
bis(2-Chloroisopropyl)ether	1	mg/kg	0.079	ND
bis(2-Ethylhexyl)phthalate	1	mg/kg	0.079	ND
Butylbenzylphthalate	1	mg/kg	0.079	ND
Caprolactam	1	mg/kg	0.079	ND
Carbazole	1	mg/kg	0.079	ND
Chrysene	1	mg/kg	0.079	ND
Dibenzo[a,h]anthracene	1	mg/kg	0.079	ND
Dibenzofuran	1	mg/kg	0.020	ND
Diethylphthalate	1	mg/kg	0.079	ND
Dimethylphthalate	1	mg/kg	0.079	ND
Di-n-butylphthalate	1	mg/kg	0.020	ND
Di-n-octylphthalate	1	mg/kg	0.079	ND
Fluoranthene	1	mg/kg	0.079	ND
Fluorene	1	mg/kg	0.079	ND
Hexachlorobenzene	1	mg/kg	0.079	ND
Hexachlorobutadiene	1	mg/kg	0.079	ND
Hexachlorocyclopentadiene	1	mg/kg	0.16	ND
Hexachloroethane	1	mg/kg	0.079	ND
Indeno[1,2,3-cd]pyrene	1	mg/kg	0.079	ND
Isophorone	1	mg/kg	0.079	ND
Naphthalene	1	mg/kg	0.020	ND
Nitrobenzene	1	mg/kg	0.079	ND
N-Nitroso-di-n-propylamine	1	mg/kg	0.020	ND
N-Nitrosodiphenylamine	1	mg/kg	0.079	ND
Pentachlorophenol	1	mg/kg	0.40	ND
Phenanthrene	1	mg/kg	0.079	ND
Phenol	1	mg/kg	0.079	ND

Pyrene	1	mg/kg	0.079		ND	

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
Terphenyl-d14	51.65	50	58	148	103	
Phenol-d5	77.72	100	49	129	78	
Nitrobenzene-d5	38.36	50	52	129	77	
2-Fluorophenol	72.86	100	43	128	73	
2-Fluorobiphenyl	38.49	50	58	125	77	
2,4,6-Tribromophenol	78.84	100	54	145	79	

Semivolatile Organics + 15 (8270) Library Searches

Analyte	DF	Units	RT	Result
Androst-4-en-3-one, 17-hydroxy-, (17.be	**1**	**mg/kg**	**12.21**	**0.47J**
Benzo[e]pyrene	**1**	**mg/kg**	**14.08**	**0.19J**
Pentacosane	**1**	**mg/kg**	**14.23**	**0.25J**
.beta.-Patchoulane	**1**	**mg/kg**	**15.77**	**0.47J**
unknown	**1**	**mg/kg**	**16.11**	**0.31J**
D-Friedoolean-14-en-3-one	**1**	**mg/kg**	**16.47**	**0.63J**
unknown	**1**	**mg/kg**	**16.59**	**0.41J**
unknown	**1**	**mg/kg**	**2.44**	**0.22J**
3-Penten-2-one, 4-methyl-	**1**	**mg/kg**	**3.86**	**0.22JAB**
unknown	**1**	**mg/kg**	**4.13**	**7.6JB**
2-Pentanone, 4-hydroxy-4-methyl-	**1**	**mg/kg**	**4.45**	**160JAB**
unknown	**1**	**mg/kg**	**5.09**	**1.8JB**
unknown	**1**	**mg/kg**	**6.85**	**0.19JB**
6-Octen-1-ol, 3,7-dimethyl-, formate	**1**	**mg/kg**	**9.84**	**0.16J**
TotalSemiVolatileTic	**1**	**mg/kg**	**NA**	**170J**

TAL Metals 6010

Analyte	DF	Units	RL	Result
Aluminum	**1**	**mg/kg**	**480**	**22000**
Barium	**1**	**mg/kg**	**24**	**59**
Calcium	**1**	**mg/kg**	**2400**	**3000**
Chromium	**1**	**mg/kg**	**12**	**99**
Cobalt	**1**	**mg/kg**	**6.0**	**14**
Copper	**1**	**mg/kg**	**12**	**110**
Iron	**1**	**mg/kg**	**480**	**55000**
Lead	**1**	**mg/kg**	**12**	**160**
Magnesium	**1**	**mg/kg**	**1200**	**9300**
Manganese	**1**	**mg/kg**	**24**	**520**
Nickel	**1**	**mg/kg**	**12**	**33**
Potassium	**1**	**mg/kg**	**1200**	**4100**
Sodium	**1**	**mg/kg**	**600**	**16000**
Vanadium	**1**	**mg/kg**	**24**	**79**
Zinc	**1**	**mg/kg**	**24**	**270**

TAL Metals 6020

Analyte	DF	Units	RL	Result
Antimony	1	mg/kg	1.9	ND
Arsenic	**1**	**mg/kg**	**0.48**	**39**
Beryllium	**2**	**mg/kg**	**0.95**	**1.7**
Cadmium	1	mg/kg	0.95	ND
Selenium	**1**	**mg/kg**	**4.8**	**7.1**
Silver	**1**	**mg/kg**	**0.48**	**1.6**
Thallium	1	mg/kg	0.95	ND

TOC (Region II/Kahn)

Analyte	DF	Units	RL	Result
Total Organic Carbon	**1**	**mg/kg**	**3100**	**59000**

Volatile Organics + 15 (8260)

Analyte	DF	Units	RL	Result
1,1,1-Trichloroethane	1.63	mg/kg	0.0078	ND
1,1,2,2-Tetrachloroethane	1.63	mg/kg	0.0078	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	1.63	mg/kg	0.0078	ND
1,1,2-Trichloroethane	1.63	mg/kg	0.0078	ND
1,1-Dichloroethane	1.63	mg/kg	0.0078	ND
1,1-Dichloroethene	1.63	mg/kg	0.0078	ND

Sample ID: B12 **Collection Date: 7/14/2016**
Lab#: AC92394-012 **Receipt Date: 7/15/2016**
Matrix: Sediment/Encore

1,2,3-Trichlorobenzene	1.63	mg/kg	0.0078	ND
1,2,4-Trichlorobenzene	1.63	mg/kg	0.0078	ND
1,2-Dibromo-3-chloropropane	1.63	mg/kg	0.0078	ND
1,2-Dibromoethane	1.63	mg/kg	0.0039	ND
1,2-Dichlorobenzene	1.63	mg/kg	0.0078	ND
1,2-Dichloroethane	1.63	mg/kg	0.0078	ND
1,2-Dichloropropane	1.63	mg/kg	0.0078	ND
1,3-Dichlorobenzene	1.63	mg/kg	0.0078	ND
1,4-Dichlorobenzene	1.63	mg/kg	0.0078	ND
1,4-Dioxane	1.63	mg/kg	0.39	ND
2-Butanone	1.63	mg/kg	0.0078	ND
2-Hexanone	1.63	mg/kg	0.0078	ND
4-Methyl-2-pentanone	1.63	mg/kg	0.0078	ND
Acetone	1.63	mg/kg	0.039	ND
Benzene	1.63	mg/kg	0.0039	ND
Bromochloromethane	1.63	mg/kg	0.0078	ND
Bromodichloromethane	1.63	mg/kg	0.0078	ND
Bromoform	1.63	mg/kg	0.0078	ND
Bromomethane	1.63	mg/kg	0.0078	ND
Carbon disulfide	1.63	mg/kg	0.0078	ND
Carbon tetrachloride	1.63	mg/kg	0.0078	ND
Chlorobenzene	1.63	mg/kg	0.0078	ND
Chloroethane	1.63	mg/kg	0.0078	ND
Chloroform	1.63	mg/kg	0.0078	ND
Chloromethane	1.63	mg/kg	0.0078	ND
cis-1,2-Dichloroethene	1.63	mg/kg	0.0078	ND
cis-1,3-Dichloropropene	1.63	mg/kg	0.0078	ND
Cyclohexane	1.63	mg/kg	0.0078	ND
Dibromochloromethane	1.63	mg/kg	0.0078	ND
Dichlorodifluoromethane	1.63	mg/kg	0.0078	ND
Ethylbenzene	1.63	mg/kg	0.0039	ND
Isopropylbenzene	1.63	mg/kg	0.0039	ND
m&p-Xylenes	1.63	mg/kg	0.0039	ND
Methyl Acetate	1.63	mg/kg	0.0078	ND
Methylcyclohexane	1.63	mg/kg	0.0078	ND
Methylene chloride	1.63	mg/kg	0.0078	ND
Methyl-t-butyl ether	1.63	mg/kg	0.0039	ND
o-Xylene	1.63	mg/kg	0.0039	ND
Styrene	1.63	mg/kg	0.0078	ND
Tetrachloroethene	1.63	mg/kg	0.0078	ND
Toluene	1.63	mg/kg	0.0039	ND
trans-1,2-Dichloroethene	1.63	mg/kg	0.0078	ND
trans-1,3-Dichloropropene	1.63	mg/kg	0.0078	ND
Trichloroethene	1.63	mg/kg	0.0078	ND
Trichlorofluoromethane	1.63	mg/kg	0.0078	ND
Vinyl chloride	1.63	mg/kg	0.0078	ND
Xylenes (Total)	1.63	mg/kg	0.0039	ND

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
Toluene-d8	26.95	30	68	122	90	
Dibromofluoromethane	34.69	30	63	140	116	
Bromofluorobenzene	30.56	30	64	129	102	
1,2-Dichloroethane-d4	33.17	30	63	143	111	

Volatile Organics + 15 (8260) Library Searches

Analyte	DF	Units	RT	Result
unknown	**1.63**	**mg/kg**	**2.85**	**0.018J**
TotalVolatileTic	**1.63**	**mg/kg**	**NA**	**0.018J**

Sample ID: B13 | **Collection Date: 7/14/2016**
Lab#: AC92394-013 | **Receipt Date: 7/15/2016**
Matrix: Sediment

% Solids SM2540G

Analyte	DF	Units	RL	Result
%Solids	**1**	**percent**		**16**

Mercury (Soil/Waste) 7471A

Analyte	DF	Units	RL	Result
Mercury	**1**	**mg/kg**	**0.52**	**0.67**

TAL Metals 6010

Analyte	DF	Units	RL	Result
Aluminum	**1**	**mg/kg**	**1200**	**20000**
Barium	1	mg/kg	62	ND
Calcium	1	mg/kg	6200	ND
Chromium	**1**	**mg/kg**	**31**	**80**
Cobalt	**1**	**mg/kg**	**16**	**130**
Copper	**1**	**mg/kg**	**31**	**110**
Iron	**1**	**mg/kg**	**1200**	**48000**
Lead	**1**	**mg/kg**	**31**	**110**
Magnesium	**1**	**mg/kg**	**3100**	**11000**
Manganese	**1**	**mg/kg**	**62**	**970**
Nickel	**1**	**mg/kg**	**31**	**130**
Potassium	**1**	**mg/kg**	**3100**	**3600**
Sodium	**1**	**mg/kg**	**1600**	**48000**
Vanadium	**1**	**mg/kg**	**62**	**66**
Zinc	**1**	**mg/kg**	**62**	**580**

TAL Metals 6020

Analyte	DF	Units	RL	Result
Antimony	1	mg/kg	5.0	ND
Arsenic	**1**	**mg/kg**	**1.2**	**39**
Beryllium	**1**	**mg/kg**	**1.2**	**2.7**
Cadmium	1	mg/kg	2.5	ND
Selenium	1	mg/kg	13	ND
Silver	1	mg/kg	1.2	ND
Thallium	1	mg/kg	2.5	ND

Sample ID: B14 | **Collection Date: 7/14/2016**
Lab#: AC92394-014 | **Receipt Date: 7/15/2016**
Matrix: Sediment

% Solids SM2540G

Analyte	DF	Units	RL	Result
%Solids	**1**	**percent**		**20**

Mercury (Soil/Waste) 7471A

Analyte	DF	Units	RL	Result
Mercury	**1**	**mg/kg**	**0.42**	**0.81**

TAL Metals 6010

Analyte	DF	Units	RL	Result
Aluminum	**1**	**mg/kg**	**1000**	**13000**
Barium	1	mg/kg	50	ND
Calcium	**1**	**mg/kg**	**5000**	**6600**
Chromium	**1**	**mg/kg**	**25**	**54**
Cobalt	**1**	**mg/kg**	**12**	**19**
Copper	**1**	**mg/kg**	**25**	**78**
Iron	**1**	**mg/kg**	**1000**	**47000**
Lead	**1**	**mg/kg**	**25**	**96**
Magnesium	**1**	**mg/kg**	**2500**	**13000**
Manganese	**1**	**mg/kg**	**50**	**1000**
Nickel	**1**	**mg/kg**	**25**	**38**
Potassium	**1**	**mg/kg**	**2500**	**4900**
Sodium	**1**	**mg/kg**	**1200**	**56000**
Vanadium	**1**	**mg/kg**	**50**	**61**
Zinc	**1**	**mg/kg**	**50**	**180**

TAL Metals 6020

Analyte	DF	Units	RL	Result
Antimony	1	mg/kg	4.0	ND
Arsenic	**1**	**mg/kg**	**1.0**	**28**
Beryllium	1	mg/kg	1.0	ND
Cadmium	1	mg/kg	2.0	ND
Selenium	1	mg/kg	10	ND
Silver	1	mg/kg	1.0	ND
Thallium	1	mg/kg	2.0	ND

HamptonClarke-Veritech Laboratories
175 Route 46 West and 2 Madison Road, Fairfield, New Jersey 07004
Ph: 800-426-9992 | 973-244-9770 Fax: 973-244-9787 | 973-439-1458
Service Center: 137-D Gaither Drive, Mount Laurel, New Jersey 08054
Ph (Service Center): 856-780-6057 Fax: 856-780-6056
NELAC/NJ #07071 | PA #68-00463 | NY #11408 | CT #PH-0671 | KY #90124

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A Women-Owned, Disadvantaged, Small Business Enterprise

CHAIN OF CUSTODY RECORD

Project# (Lab Use Only): 6071513

Page _____ of _____

3) Reporting Requirements (Please Circle)

Turnaround	Report Type	Electronic Deliv.
Standard	NJ Reduced	Excel & PDF

Expedited TAT Not Always Available. Please Check with Lab.

Customer Information

1a) Customer: HDR
Address: 1 International Blvd
Mahwah NJ 07495
1b) Email/Cell/Fax/Ph: 201.335.9341
1c) Send Invoice to: Dave Brizzolara
1d) Send Report to: Dave Brizzolara

Project Information

2a) Project: Whale Creek
2b) Project Mgr: Dave Brizzolara
2c) Project Location (City/State): Keyport, NJ
2d) Quote/PO # (If Applicable):

FOR LAB USE ONLY

Batch # AC92394

Check If Contingent ===>

Matrix Codes
DW - Drinking Water S - Soil A - Air
GW - Ground Water SL - Sludge
WW - Waste Water OL - Oil
OT - Other (please specify under item 9, Comments)

7) Analysis Request

<=== Check If Contingent

Lab Sample #	4) Customer Sample ID	5) Matrix	6) Sample Date	6) Sample Time	Preservative: Composite (C)	Preservative: Grab (G)	Full Suite (NONE)	TAL Metals (NONE)	Dioxins/Furans (NONE)	VOC/ % Moisture (NONE)	Grain size (NONE)	8) # of Bottles	Other:	9) Comments
-001	B1	Sedimen	7/14/16	1045	X			1	1			1 1		
-002	B2 (D) MW	Sedimen	7/14/16	1040	X		1			2	1	1 2 1		
-003	B3	Sedimen	7/14/16	1030	X			1				1		
-004	B4 (D)	Sedimen	7/14/16	1020	X			1				1		
-005	B5	Sedimen	7/14/16	1010	X			1				1		
-006	B6 (D) MW	Sedimen	7/14/16	0955	X			1				1		
-007	B7	Sedimen	7/14/16	0945	X			1	1			1 1		
-008	B8 (D)	Sedimen	7/14/16	0930	X			1				1		
-009	B9	Sedimen	7/14/16	0915	X			1	1			1 1		
-010	B10	Sedimen	7/14/16	0900	X			1	1			1 1		

10) Relinquished by:	Accepted by:	Date	Time
		7.14.16	1200
		7/15/16	1145
		7/15/16	1226

Additional Notes
Full suite = BNA's, Pesticides/PCBs, TAL Metals, CN, TOC, pH

Comments, Notes, Special Requirements, HAZARDS

Note: Check if low-level groundwater methods required to meet current standards in NJ or PA:
- ☐ BN or BNA (8270C SIM)
- ☐ VOC (8260B SIM or 8011)
- ☐ Metals (ICP-MS 200.8 or 6020)
- ☐ Metals-**Soil** (ICP-MS 6020 for Be & Ag)

Note: Check if applicable:
- ☐ **Project-Specific Reporting Limits**
- ☐ **High Contaminant Concentrations**
- ☐ **NJ LSRP Project**

Cooler Temperature: 2.6°C

11) Sampler (print name): Date:

Please note NUMBERED items. If not completed your analytical work may be delayed.
A fee of $5/sample will be assessed for storage should sample not be activated for any analysis.

HamptonClarke-Veritech Laboratories
175 Route 46 West and 2 Madison Road, Fairfield, New Jersey 07004
Ph: 800-426-9992 | 973-244-9770 Fax: 973-244-9787 | 973-439-1458
Service Center: 137-D Gaither Drive, Mount Laurel, New Jersey 08054
Ph (Service Center): 856-780-6057 Fax: 856-780-6056
HC·V HamptonClarke Veritech Laboratories
A Women-Owned, Disadvantaged, Small Business Enterprise
NELAC/NJ #07071 | PA #68-00463 | NY #11408 | CT #PH-0671 | KY #90124

CHAIN OF CUSTODY RECORD

Project# (Lab Use Only): 607513

Page _____ of _____

3) Reporting Requirements (Please Circle)

Turnaround	Report Type	Electronic Deliv.
Standard	NJ Reduced	Excel & PDF

Expedited TAT Not Always Available. Please Check with Lab.

Customer Information

1a) Customer: HDR
Address: 1 International Blvd
Mahwah NJ 07495
1b) Email/Cell/Fax/Ph: 201.335.9341
1c) Send Invoice to: Dave Brizzolara
1d) Send Report to: Dave Brizzolara

Project Information

2a) Project: Whale Creek
2b) Project Mgr: Dave Brizzolara
2c) Project Location (City/State): Keyport, NJ
2d) Quote/PO # (If Applicable):

FOR LAB USE ONLY

Batch # AC92394

Check If Contingent ===>

Matrix Codes
DW - Drinking Water S - Soil A - Air
GW - Ground Water SL - Sludge
WW - Waste Water OL - Oil
OT - Other (please specify under item 9, Comments)

7) Analysis Request <=== Check If Contingent

Lab Sample #	4) Customer Sample ID	5) Matrix	6) Sample Date	6) Sample Time	Preservative: Composite (C)	Preservative: Grab (G)	Full Suite (NONE)	TAL Metals (NONE)	Dioxins/Furans (NONE)	VOC/ % Moisture (NONE)	Grain size	8) # of Bottles	Other:	9) Comments
-011	B11	Sedim	7/14/16	1045	X			1	1			1 1		
-012	B12	Sedim	7/14/16	1040	X		1			2	1	1 2 1		
-013	B13	Sedim	7/14/16	1030	X			1				1		
-014	B14	Sedim	7/14/16	1020	X			1	1			1		
				1010				1				1		
				0955				1				1		
				0945				1	1			1 1		
				0930				1				1		
				0915				1	1			1 1		
				0900				1	1			1 1		

10) Relinquished by:	Accepted by:	Date	Time
		7.14.16	1700
		7-15-16	1145
		7/15/16	1226

Additional Notes
Full suite = BNA's, Pesticides/PCBs, TAL Metals, CN, TOC, pH

Comments, Notes, Special Requirements, HAZARDS

Note: Check if low-level groundwater methods required to meet current standards in NJ or PA:
- ☐ BN or BNA (8270C SIM)
- ☐ VOC (8260B SIM or 8011)
- ☐ Metals (ICP-MS 200.8 or 6020)
- ☐ Metals-Soil (ICP-MS 6020 for Be & Ag)

Note: Check if applicable:
- ☐ Project-Specific Reporting Limits
- ☐ High Contaminant Concentrations
- ☐ NJ LSRP Project

Cooler Temperature: 2.3

11) Sampler (print name): Date:

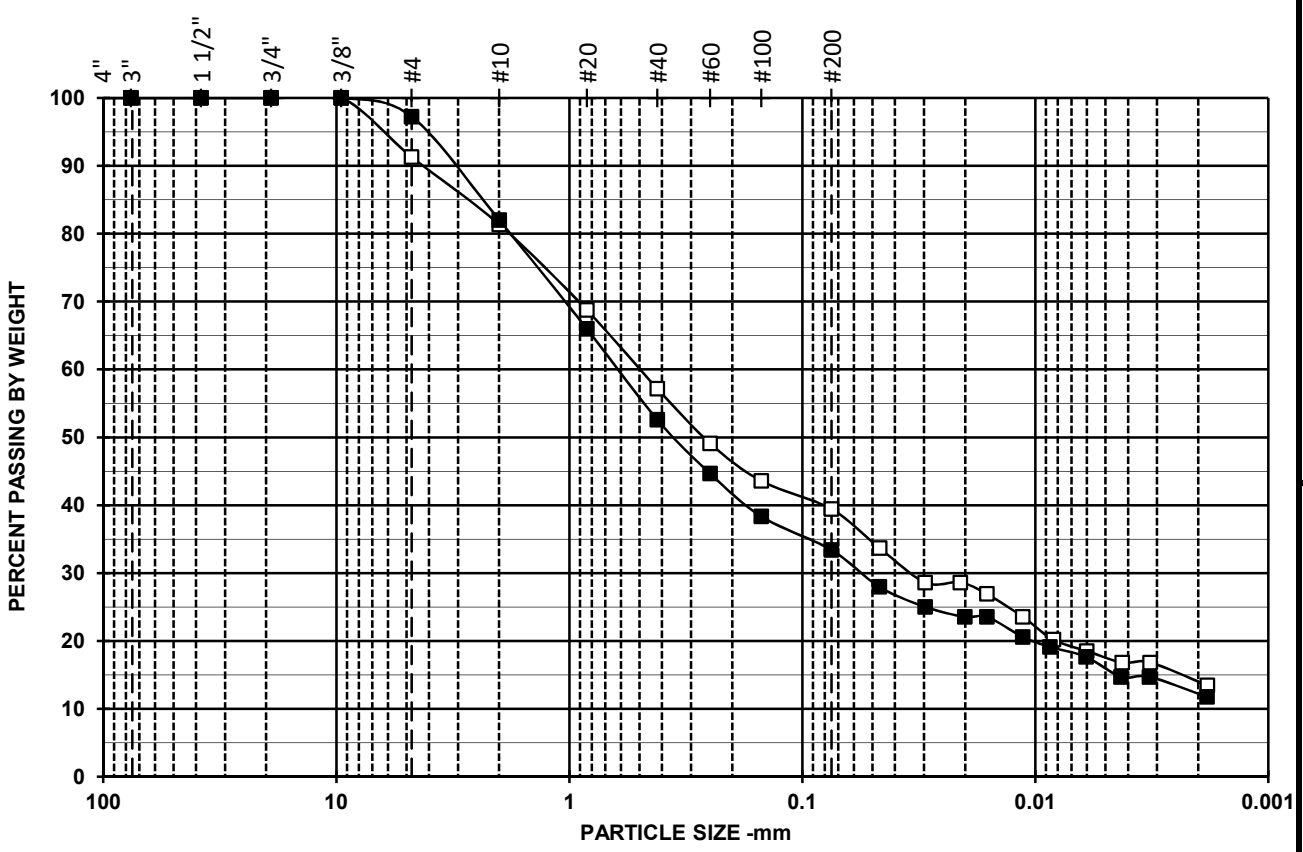
Please note NUMBERED items. If not completed your analytical work may be delayed.
A fee of $5/sample will be assessed for storage should sample not be activated for any analysis.

December 2016 Laboratory Results

Hampton Clarke Veritech #6123013
AC95422
LABORATORY TESTING DATA SUMMARY

GROUP ID	SAMPLE NO.	CLIENT ID	TEST DATE	IDENTIFICATION TESTS			REMARKS
				USCS SYMB. (1)	SIEVE MINUS NO. 200 (%)	HYDROMETER % MINUS 2 μm (%)	
AC95422	001	WCSB01	1/6/2017	SM	39.4	14	
AC95422	002	WCSB02	1/6/2017	SM	33.4	12	
AC95422	003	WCSB03	1/6/2017	OH	77.6	24	
AC95422	004	WCSB04	1/6/2017	SM	37.2	13	
AC95422	005	WCSB05	1/6/2017	OH	63.6	19	
AC95422	006	WCSB06	1/6/2017	OH	90.1	35	
AC95422	007	WCSB07	1/9/2017	OH	96.1	39	
AC95422	008	WCSB08	1/9/2017	OH	95.7	43	
AC95422	009	WCSB09	1/9/2017	OH	65.5	26	
AC95422	010	WCSB10	1/9/2017	OH	63.6	22	

Note: (1) USCS symbol based on visual observation and Sieve reported.



Symbol	□	■	○
Group#	AC95422	AC95422	
ID	001	002	
Client ID	WCSB01	WCSB02	
% +3"	0.0	0.0	
% Gravel	8.7	2.8	
% SAND	51.9	63.8	
%C SAND	9.9	15.2	
%M SAND	24.2	29.4	
%F SAND	17.8	19.2	
% FINES	39.4	33.4	
D_{100} (mm)	9.53	9.53	
D_{60} (mm)	0.50	0.62	
D_{30} (mm)			
D_{10} (mm)			
Cc			
Cu			

Sieve Size/ID #	Percent Finer Data		
6"	100.0	100.0	
6"	100.0	100.0	
6"	100.0	100.0	
6"	100.0	100.0	
4"	100.0	100.0	
3"	100.0	100.0	
1 1/2"	100.0	100.0	
3/4"	100.0	100.0	
3/8"	100.0	100.0	
#4	91.3	97.2	
#10	81.4	82.0	
#20	68.8	66.0	
#40	57.2	52.6	
#60	49.1	44.7	
#100	43.6	38.3	
#200	39.4	33.4	
5μ m	18	16	
2μ m	14	12	
1μ m	10	9	

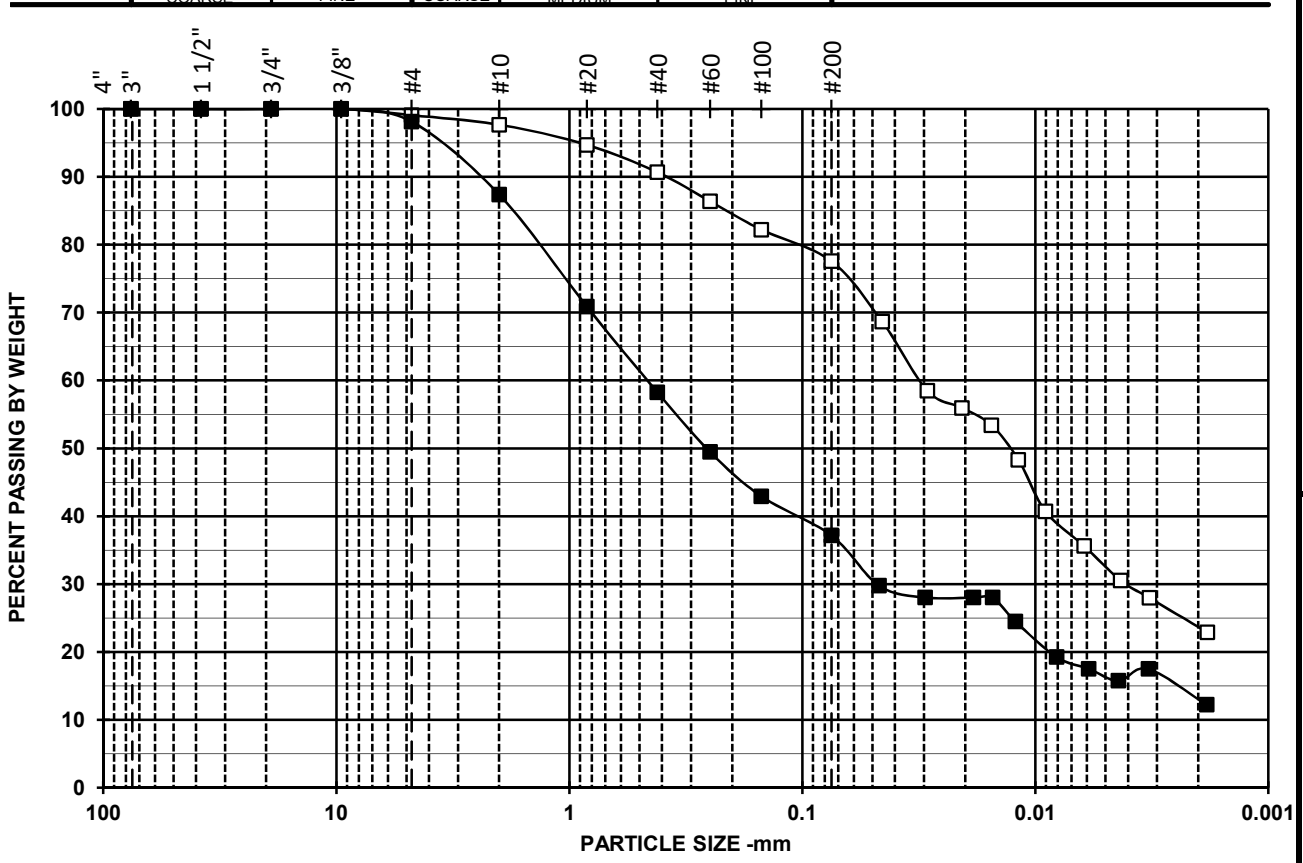
SYMBOL	w (%)	LL	PL	PI	USCS	AASHTO	USCS DESCRIPTION AND REMARKS	DATE
□	535.2				SM		Dark brown, Silty sand sized vegetation and fibers	01/06/17
■	537.4				SM		Dark brown , Silty sand sized vegetation and fibers	01/06/17
○								

Hampton Clarke Veritech #6123013

TerraSense, LLC #7736-17001

AC95422

PARTICLE SIZE DISTRIBUTION



Symbol	□	■	○
Group#	AC95422	AC95422	
ID	003	004	
Client ID	WCSB03	WCSB04	
% +3"	0.0	0.0	
% Gravel	0.9	1.9	
% SAND	21.5	60.9	
%C SAND	1.4	10.7	
%M SAND	7.0	29.1	
%F SAND	13.1	21.1	
% FINES	77.6	37.2	
D_{100} (mm)	9.53	9.53	
D_{60} (mm)		0.46	
D_{30} (mm)			
D_{10} (mm)			
Cc			
Cu			

Sieve Size/ID #	Percent Finer Data		
6"	100.0	100.0	
6"	100.0	100.0	
6"	100.0	100.0	
6"	100.0	100.0	
4"	100.0	100.0	
3"	100.0	100.0	
1 1/2"	100.0	100.0	
3/4"	100.0	100.0	
3/8"	100.0	100.0	
#4	99.1	98.1	
#10	97.7	87.4	
#20	94.7	70.9	
#40	90.7	58.3	
#60	86.4	49.5	
#100	82.2	42.9	
#200	77.6	37.2	
5μ m	33	17	
2μ m	24	13	
1μ m	18	7	

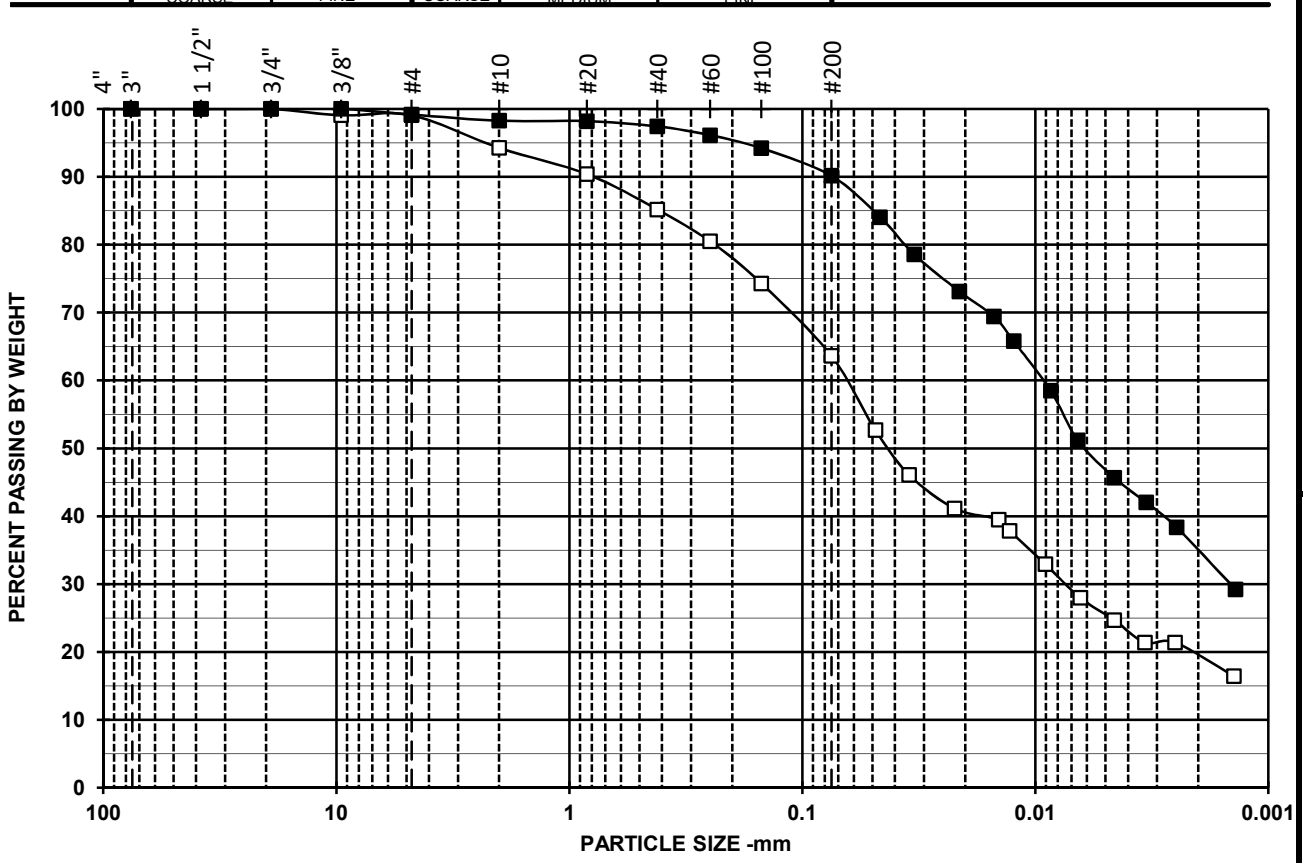
SYMBOL	w (%)	LL	PL	PI	USCS	AASHTO	USCS DESCRIPTION AND REMARKS	DATE
□	443.5				OH		Dark brown, Organic silt with sand sized vegetation and fibers	01/06/17
■	629.5				SM		Dark brown , Silty sand sized vegetation and fibers	01/06/17
○								

Hampton Clarke Veritech #6123013

TerraSense, LLC #7736-17001

AC95422

PARTICLE SIZE DISTRIBUTION



Symbol	□	■	○
Group#	AC95422	AC95422	
ID	005	006	
Client ID	WCSB05	WCSB06	
% +3"	0.0	0.0	
% Gravel	0.9	0.8	
% SAND	35.5	9.1	
%C SAND	4.8	0.9	
%M SAND	9.1	0.8	
%F SAND	21.6	7.3	
% FINES	63.6	90.1	
D_{100} (mm)	19.05	9.53	
D_{60} (mm)	0.06	0.01	
D_{30} (mm)	0.01	0.00	
D_{10} (mm)			
Cc			
Cu			

Sieve Size/ID #	Percent Finer Data		
6"	100.0	100.0	
6"	100.0	100.0	
6"	100.0	100.0	
6"	100.0	100.0	
4"	100.0	100.0	
3"	100.0	100.0	
1 1/2"	100.0	100.0	
3/4"	100.0	100.0	
3/8"	99.1	100.0	
#4	99.1	99.2	
#10	94.3	98.3	
#20	90.4	98.2	
#40	85.2	97.4	
#60	80.5	96.1	
#100	74.3	94.2	
#200	63.6	90.1	
5μ m	26	47	
2μ m	19	35	
1μ m	14	24	

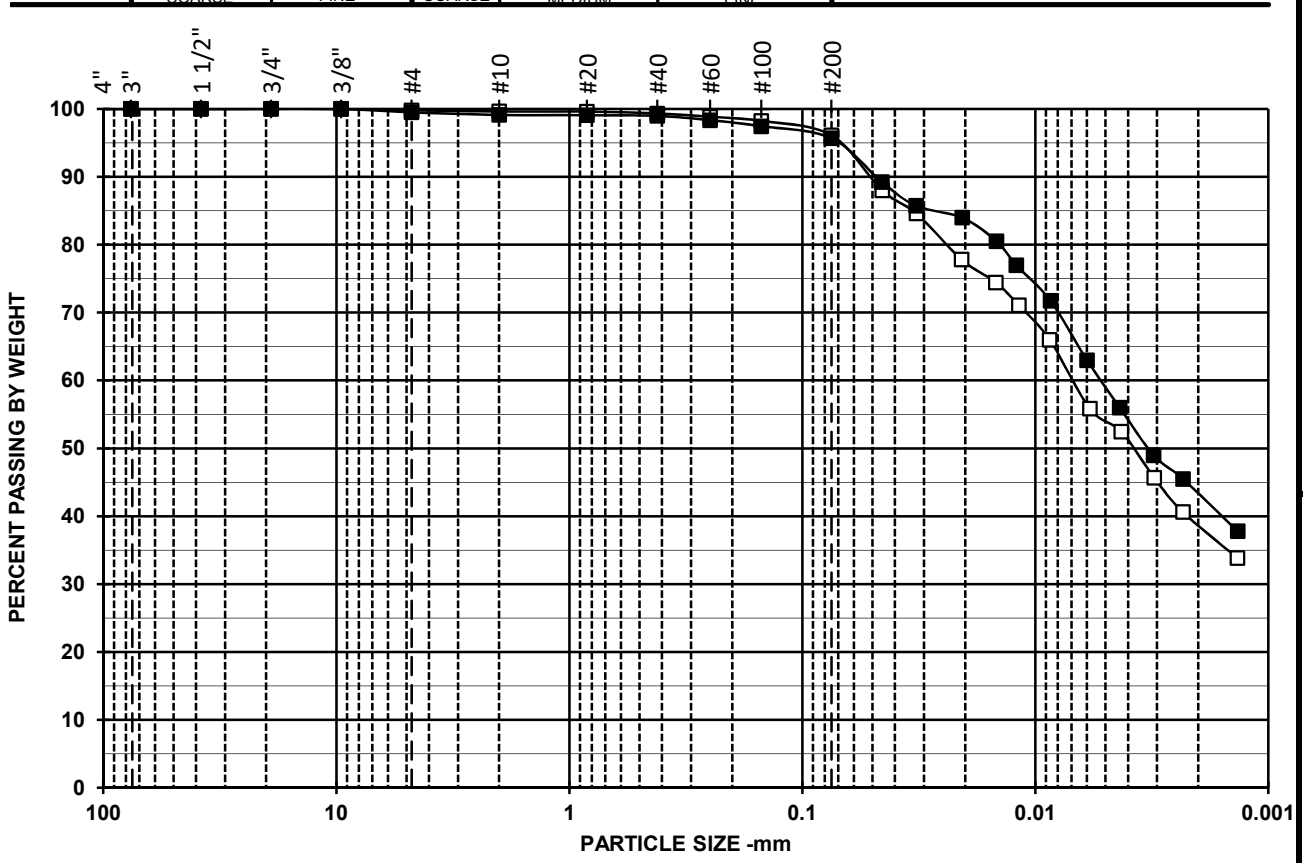
SYMBOL	w (%)	LL	PL	PI	USCS	AASHTO	USCS DESCRIPTION AND REMARKS	DATE
□	177.0				OH		Dark brown, Sandy Organic silt vegetation fiber noted	01/06/17
■	177.3				OH		Brown , Organic clay organic mat'l noted	01/06/17
○								

Hampton Clarke Veritech #6123013

TerraSense, LLC #7736-17001

AC95422

PARTICLE SIZE DISTRIBUTION



Symbol	□	■	○
Group#	AC95422	AC95422	
ID	007	008	
Client ID	WCSB07	WCSB08	
% +3"	0.0	0.0	
% Gravel	0.2	0.5	
% SAND	3.7	3.8	
%C SAND	0.2	0.4	
%M SAND	0.3	0.1	
%F SAND	3.2	3.3	
% FINES	96.1	95.7	
D_{100} (mm)	9.53	9.53	
D_{60} (mm)	0.01	0.01	
D_{30} (mm)			
D_{10} (mm)			
Cc			
Cu			

Sieve Size/ID #	Percent Finer Data		
6"	100.0	100.0	
6"	100.0	100.0	
6"	100.0	100.0	
6"	100.0	100.0	
4"	100.0	100.0	
3"	100.0	100.0	
1 1/2"	100.0	100.0	
3/4"	100.0	100.0	
3/8"	100.0	100.0	
#4	99.8	99.5	
#10	99.6	99.1	
#20	99.6	99.1	
#40	99.3	99.0	
#60	98.8	98.3	
#100	98.2	97.4	
#200	96.1	95.7	
5μ m	54	59	
2μ m	39	43	
1μ m	30	33	

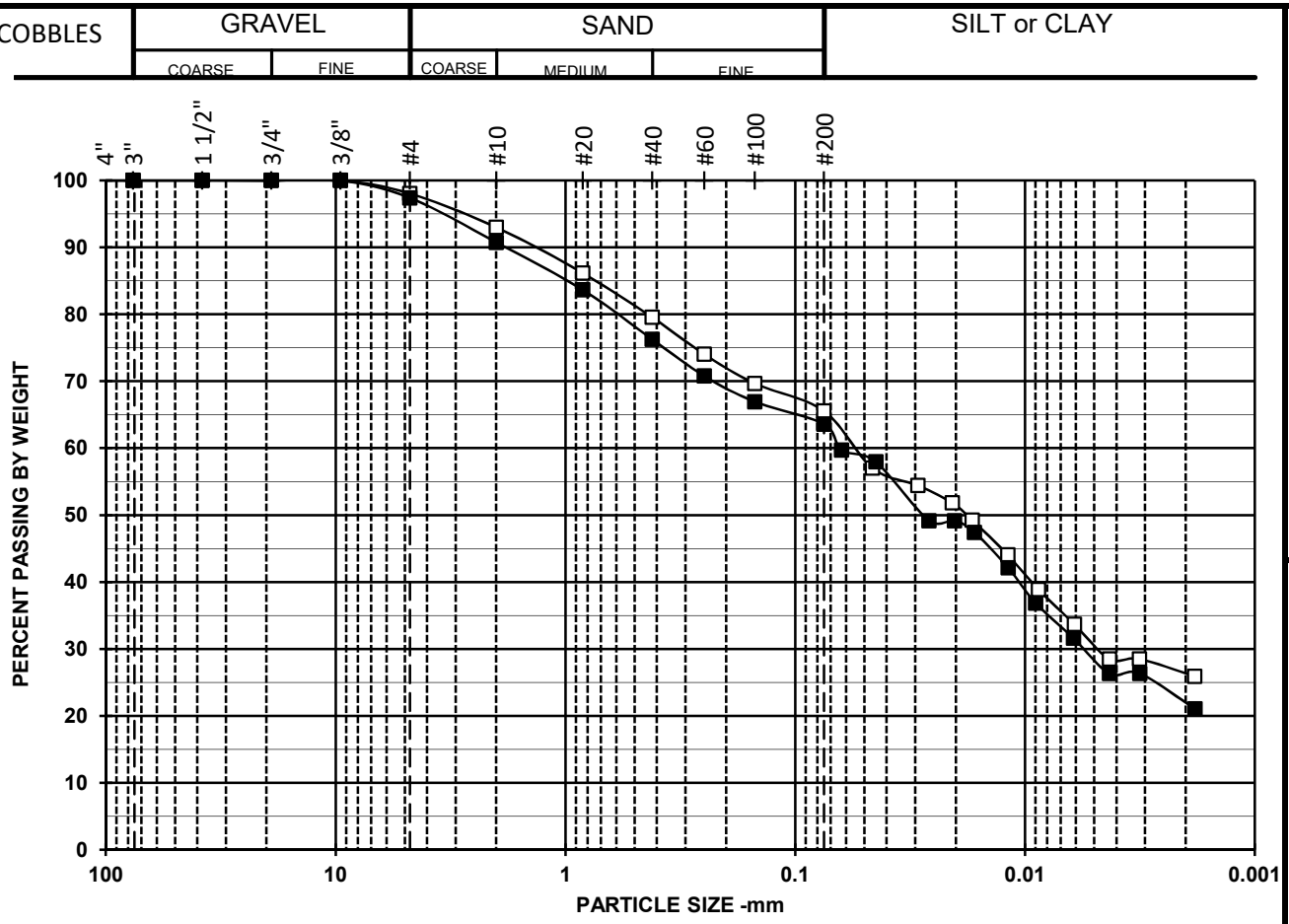
SYMBOL	w (%)	LL	PL	PI	USCS	AASHTO	USCS DESCRIPTION AND REMARKS	DATE
□	158.8				OH		Brown, Organic clay organic mat'l noted	01/09/17
■	193.0				OH		Brown , Organic clay organic mat'l noted	01/09/17
○								

Hampton Clarke Veritech #6123013

TerraSense, LLC #7736-17001

AC95422

PARTICLE SIZE DISTRIBUTION



Symbol	□	■	○
Group#	AC95422	AC95422	
ID	009	010	
Client ID	WCSB09	WCSB10	
% +3"	0.0	0.0	
% Gravel	2.0	2.6	
% SAND	32.5	33.8	
%C SAND	5.1	6.6	
%M SAND	13.4	14.5	
%F SAND	14.0	12.7	
% FINES	65.5	63.6	
D_{100} (mm)	9.53	9.53	
D_{60} (mm)			
D_{30} (mm)			
D_{10} (mm)			
Cc			
Cu			

Sieve Size/ID #	Percent Finer Data		
6"	100.0	100.0	
6"	100.0	100.0	
6"	100.0	100.0	
6"	100.0	100.0	
4"	100.0	100.0	
3"	100.0	100.0	
1 1/2"	100.0	100.0	
3/4"	100.0	100.0	
3/8"	100.0	100.0	
#4	98.0	97.4	
#10	93.0	90.7	
#20	86.2	83.6	
#40	79.5	76.3	
#60	74.0	70.8	
#100	69.7	66.9	
#200	65.5	63.6	
5μ m	31	29	
2μ m	26	22	
1μ m	23	15	

SYMBOL	w (%)	LL	PL	PI	USCS	AASHTO	USCS DESCRIPTION AND REMARKS	DATE
□	512.9				OH		Very dark brown, Sandy Organic silt matter	01/09/17
■	364.4				OH		Very dark brown , Sandy Organic silt matter	01/09/17
○								

Hampton Clarke Veritech #6123013

TerraSense, LLC #7736-17001

AC95422

PARTICLE SIZE DISTRIBUTION

Pace Analytical™
www.pacelabs.com

Pace Analytical Services, Inc.
1700 Elm Street
Minneapolis, MN 55414
Phone: 612.607.1700
Fax: 612.607.6444

Report Prepared for:

Melissa D'Almeida
Veritech
175 Route 46 West
Unit D
Fairfield NJ 07004

REPORT OF LABORATORY ANALYSIS FOR PCDD/PCDF

Report Information:

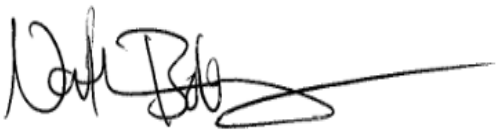
Pace Project #: 10374907
Sample Receipt Date: 01/04/2017
Client Project #: 6123013
Client Sub PO #: N/A
State Cert #: MN002

Invoicing & Reporting Options:

The report provided has been invoiced as a Level 2 PCDD/PCDF Report. If an upgrade of this report package is requested, an additional charge may be applied.

Please review the attached invoice for accuracy and forward any questions to Nathan Boberg, your Pace Project Manager.

This report has been reviewed by:



January 18, 2017
Nathan Boberg, Project Manager

(612) 607-6444 (fax)
nathan.boberg@pacelabs.com

Report Prepared Date:
January 18, 2017

Report of Laboratory Analysis

Pace Analytical Services, Inc.
1700 Elm Street
Minneapolis, MN 55414
Phone: 612.607.1700
Fax: 612.607.6444

DISCUSSION

This report presents the results from the analyses performed on ten samples submitted by a representative of Veritech. The samples were analyzed for the presence or absence of polychlorodibenzo-p-dioxins (PCDDs) and polychlorodibenzofurans (PCDFs) using a modified version of USEPA Method 8290. The reporting limits were set to correspond to the lowest calibration points and were adjusted for sample amount. Estimated Maximum Possible Concentration (EMPC) values were treated as positives in the toxic equivalence calculations.

Second column confirmation analyses of 2,3,7,8-TCDF values obtained from the primary (DB5-MS) column are performed only when specifically requested for a project and only when the values are above the concentration of the lowest calibration standard. Typical resolution for this isomer using the DB5-MS column ranges from 25-30%.

The recoveries of the isotopically-labeled PCDD/PCDF internal standards in the sample extracts ranged from 29-90%. Except for four low values, which were flagged "R" on the results table, the labeled internal standard recoveries obtained for this project were within the 40-135% target range specified in Method 8290. Also, since the quantification of the native 2,3,7,8-substituted congeners was based on isotope dilution, the data were automatically corrected for recovery and accurate values were obtained.

Values were flagged "P" where polychlorinated diphenyl ethers were present. Concentrations above the calibration range were flagged "E" and should be regarded as estimates.

A laboratory method blank was prepared and analyzed with each sample batch as part of our routine quality control procedures. The results show the blanks to be free of PCDDs and PCDFs at the reporting limits. These results indicate that the sample processing steps did not significantly impact the results of the field sample determinations.

Laboratory and matrix spike samples were also prepared using clean sand or sample matrix that had been fortified with native standard materials. The results show that the spiked native compounds were generally recovered at 82-123% with relative percent differences (RPDs) generally from 0.2-8.2%. The background-subtracted recoveries obtained for OCDD in the matrix spike analyses were above the 70-130% target range. Also, the RPD value obtained for OCDD in the matrix spike analyses was above the 20% target upper limit. These deviations may be due to the level of the this congener in the sample material and/or sample inhomogeneity. Matrix spikes were prepared with the 01/13/2017 extraction batch using sample material from a separate project; results from these analyses will be provided upon request.

The responses obtained for the labeled OCDD in calibration standard analyses U170110B_09 and F170117B_15 were outside the target range. As specified in our procedures, the averages of the daily response factors for this compound were used in the calculations for the samples from these runshifts. The affected values were flagged "Y" on the results tables. It should be noted that the accuracy of the native congener determinations was not impacted by these deviations.

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Minnesota Laboratory Certifications

Authority	Certificate #	Authority	Certificate #
A2LA	2926.01	Mississippi	MN00064
Alabama	40770	Montana	92
Alaska	MN00064	Nebraska	NE-OS-18-06
Arizona	AZ0014	Nevada	MN_00064_200
Arkansas	88-0680	New Jersey (NE	MN002
California	01155CA	New York (NEL	11647
Colorado	MN00064	North Carolina	27700
Connecticut	PH-0256	North Dakota	R-036
EPA Region 8	8TMS-Q	Ohio	4150
Florida (NELAP	E87605	Oklahoma	D9922
Georgia (DNR)	959	Oregon (ELAP)	MN200001-005
Guam	959	Oregon (OREL	MN300001-001
Hawaii	SLD	Pennsylvania	68-00563
Idaho	MN00064	Puerto Rico	MN00064
Illinois	200012	Saipan	MP0003
Indiana	C-MN-01	South Carolina	74003001
Indiana	C-MN-01	Tennessee	TN02818
Iowa	368	Texas	T104704192-08
Kansas	E-10167	Utah (NELAP)	MN00064
Kentucky	90062	Virginia	00251
Louisiana	03086	Washington	C755
Maine	2007029	West Virginia #	9952C
Maryland	322	West Virginia D	382
Michigan	9909	Wisconsin	999407970
Minnesota	027-053-137	Wyoming	8TMS-Q

REPORT OF LABORATORY ANALYSIS

Appendix A

Sample Management

CHAIN OF CUSTODY RECORD

10374907

Hampton-Clarke, Inc.
175 US Hwy 46 West
Fairfield, New Jersey, 07004
Ph:800-426-9992 Fax:973-439-1458

Report No....10374907_8290

Report To:	Invoice To:	Project #:	CocID#:
Hampton-Clarke, Inc.:	Hampton-Clarke, Inc.:	6123013	5295
Attn:Reporting	Attn:Accounting		
175 Route 46 West	175 Route 46 West		
Fairfield, New Jersey 07004	Fairfield, New Jersey 07004		

FINAL RESULTS TO: subresults@hcvlab.com
PRELIM/VERBAL RESULTS TO: subresults@hcvlab.com

EDD: NEW JERSEY HAZRESULT OR EQUIS EZEDD REQUIRED FOR ALL DATA SUBMITTALS!

Turn Around Time: Standard **Preliminary Due Date:** 1/18/2017
Report Type: NJDEP-R (REDUCED) **Hard Copy Due Date:** 1/24/2017

Sample Number:	Client ID	Matrix:	Date Collected:	Time Collected:	Analysis Requested	
AC95422-001	WCSB01	Soil/Enc	12/30/2016	12:00:00 PM	Dioxins/Furans 8290	001
AC95422-002	WCSB02	Soil/Enc	12/30/2016	12:12:00 PM	Dioxins/Furans 8290	002
AC95422-003	WCSB03	Soil/Enc	12/30/2016	12:33:00 PM	Dioxins/Furans 8290	003
AC95422-004	WCSB04	Soil/Enc	12/30/2016	11:00:00 AM	Dioxins/Furans 8290	004
AC95422-005	WCSB05	Soil/Enc	12/30/2016	10:20:00 AM	Dioxins/Furans 8290	005 MP
AC95422-006	WCSB06	Soil/Enc	12/30/2016	10:10:00 AM	Dioxins/Furans 8290	006 1/3/17
AC95422-007	WCSB07	Soil/Enc	12/30/2016	11:30:00 AM	Dioxins/Furans 8290	007
AC95422-008	WCSB08	Soil/Enc	12/30/2016	1:30:00 PM	Dioxins/Furans 8290	008
AC95422-009	WCSB09	Soil/Enc	12/30/2016	1:45:00 PM	Dioxins/Furans 8290	009
AC95422-010	WCSB10	Soil/Enc	12/30/2016	2:05:00 PM	Dioxins/Furans 8290	010

Relinquished By:	Accepted By:	Date:	Time:	Comments, Notes, Special Requirements, HAZARDS
UPS	UPS	01/03/17	17:00	
		1-4-17	9:30	

Cooler Temp: 2.2°C

HC Lab Use Only Subcontracted Lab Id and Contact: PACE, Scott Unze, (612) 608-6383, LabID: H, 1700 Elm Street, Suite 200, Minneapolis, MN, 55414

Pace Analytical	Document Name: **Sample Condition Upon Receipt Form**	Document Revised: 19Dec2016 Page 1 of 2
	Document No.: **F-MN-L-213-rev.20**	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt

Client Name: Hampton-Clarke

Project #: WO# : 10374907

10374907

Courier: ☐ Fed Ex ☑ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace ☐ SpeeDee ☐ Other:

Tracking Number: 1Z 1X7 842 13 9141 7257

Custody Seal on Cooler/Box Present? ☐ Yes ☑ No **Seals Intact?** ☐ Yes ☑ No

Optional: Proj. Due Date: Proj. Name:

Packing Material: ☑ Bubble Wrap ☐ Bubble Bags ☐ None ☐ Other: **Temp Blank?** ☐ Yes ☑ No

Thermometer Used: ☑ 151401163 ☐ 151401164 **Type of Ice:** ☑ Wet ☐ Blue ☐ None ☐ Samples on ice, cooling process has begun

Cooler Temp Read (°C): 2.3 **Cooler Temp Corrected (°C):** 2.2 **Biological Tissue Frozen?** ☐ Yes ☐ No ☑ N/A

Temp should be above freezing to 6°C **Correction Factor:** -0.1 **Date and Initials of Person Examining Contents:** KAC 1-4-17

USDA Regulated Soil (☐ N/A, water sample)

Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX or VA (check maps)? ☐ Yes ☑ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☑ No

If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

				COMMENTS:
Chain of Custody Present?	☑ Yes	☐ No		1.
Chain of Custody Filled Out?	☑ Yes	☐ No		2.
Chain of Custody Relinquished?	☑ Yes	☐ No		3.
Sampler Name and/or Signature on COC?	☐ Yes	☑ No	☐ N/A	4.
Samples Arrived within Hold Time?	☑ Yes	☐ No		5.
Short Hold Time Analysis (<72 hr)?	☐ Yes	☑ No		6.
Rush Turn Around Time Requested?	☐ Yes	☑ No		7.
Sufficient Volume?	☑ Yes	☐ No		8.
Correct Containers Used?	☑ Yes	☐ No		9.
-Pace Containers Used?	☑ Yes	☐ No		
Containers Intact?	☑ Yes	☐ No		10.
Filtered Volume Received for Dissolved Tests?	☐ Yes	☐ No	☑ N/A	11. Note if sediment is visible in the dissolved container
Sample Labels Match COC? -Includes Date/Time/ID/Analysis Matrix: SL	☑ Yes	☐ No		12.
All containers needing acid/base preservation have been checked?	☐ Yes	☐ No	☑ N/A	13. ☐ HNO_3 ☐ H_2SO_4 ☐ NaOH Positive for Res. Chlorine? Y N
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO_3, H_2SO_4, <2pH, NaOH >9 Sulfide, NaOH>12 Cyanide)	☐ Yes	☐ No	☑ N/A	Sample #
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin.	☐ Yes	☐ No	☑ N/A	Initial when completed: Lot # of added preservative:
Headspace in VOA Vials (>6mm)?	☐ Yes	☐ No	☑ N/A	14.
Trip Blank Present?	☐ Yes	☐ No	☑ N/A	15.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☑ N/A	
Pace Trip Blank Lot # (if purchased):				

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐ Yes ☐ No

Person Contacted: Date/Time:

Comments/Resolution:

Project Manager Review: Nathan Roberg **Date:** 1/5/17

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

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Reporting Flags

A = Reporting Limit based on signal to noise

B = Less than 10x higher than method blank level

C = Result obtained from confirmation analysis

D = Result obtained from analysis of diluted sample

E = Exceeds calibration range

I = Interference present

J = Estimated value

Nn = Value obtained from additional analysis

P = PCDE Interference

R = Recovery outside target range

S = Peak saturated

U = Analyte not detected

V = Result verified by confirmation analysis

X = %D Exceeds limits

Y = Calculated using average of daily RFs

* = See Discussion

Appendix B

Sample Analysis Summary

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Method 8290 Sample Analysis Results

Client - Veritech

Client's Sample ID	AC95422-001		
Lab Sample ID	10374907001		
Filename	U170110B_06		
Injected By	SMT		
Total Amount Extracted	16.5 g	Matrix	Soil
% Moisture	82.1	Dilution	NA
Dry Weight Extracted	2.95 g	Collected	12/30/2016 12:00
ICAL ID	U161025	Received	01/04/2017 09:30
CCal Filename(s)	U170110A_17 & U170110B_09	Extracted	01/06/2017 20:00
Method Blank ID	BLANK-53441	Analyzed	01/11/2017 05:20

Native Isomers	**Conc** ng/Kg	**EMPC** ng/Kg	**RL** ng/Kg	**Internal Standards**	**ng's Added**	**Percent Recovery**
2,3,7,8-TCDF	5.4	-----	3.4	2,3,7,8-TCDF-13C	2.00	63
Total TCDF	77.0	-----	3.4	2,3,7,8-TCDD-13C	2.00	71
				1,2,3,7,8-PeCDF-13C	2.00	58
2,3,7,8-TCDD	ND	-----	3.4	2,3,4,7,8-PeCDF-13C	2.00	56
Total TCDD	5.2	-----	3.4	1,2,3,7,8-PeCDD-13C	2.00	63
				1,2,3,4,7,8-HxCDF-13C	2.00	70
1,2,3,7,8-PeCDF	ND	-----	17.0	1,2,3,6,7,8-HxCDF-13C	2.00	66
2,3,4,7,8-PeCDF	ND	-----	17.0	2,3,4,6,7,8-HxCDF-13C	2.00	68
Total PeCDF	19.0	-----	17.0	1,2,3,7,8,9-HxCDF-13C	2.00	63
				1,2,3,4,7,8-HxCDD-13C	2.00	68
1,2,3,7,8-PeCDD	ND	-----	17.0	1,2,3,6,7,8-HxCDD-13C	2.00	61
Total PeCDD	ND	-----	17.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	52
				1,2,3,4,7,8,9-HpCDF-13C	2.00	48
1,2,3,4,7,8-HxCDF	ND	-----	17.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	55
1,2,3,6,7,8-HxCDF	ND	-----	17.0	OCDD-13C	4.00	47 Y
2,3,4,6,7,8-HxCDF	ND	-----	17.0			
1,2,3,7,8,9-HxCDF	ND	-----	17.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	-----	17.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	-----	17.0	2,3,7,8-TCDD-37Cl4	0.20	71
1,2,3,6,7,8-HxCDD	ND	-----	17.0			
1,2,3,7,8,9-HxCDD	ND	-----	17.0			
Total HxCDD	75.0	-----	17.0			
1,2,3,4,6,7,8-HpCDF	33.0	-----	17.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	-----	17.0	Equivalence: 3.2 ng/Kg		
Total HpCDF	56.0	-----	17.0	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	130.0	-----	17.0			
Total HpCDD	310.0	-----	17.0			
OCDF	37.0	-----	34.0			
OCDD	3200.0	-----	34.0			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).
EMPC = Estimated Maximum Possible Concentration
RL = Reporting Limit

ND = Not Detected
NA = Not Applicable
NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.
Y = Calculated using average of daily RFs

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Method 8290 Sample Analysis Results

Client - Veritech

Client's Sample ID	AC95422-002		
Lab Sample ID	10374907002		
Filename	U170110A_08		
Injected By	SMT		
Total Amount Extracted	16.8 g	Matrix	Soil
% Moisture	84.4	Dilution	NA
Dry Weight Extracted	2.62 g	Collected	12/30/2016 12:12
ICAL ID	U161025	Received	01/04/2017 09:30
CCal Filename(s)	U170110A_01 & U170110A_17	Extracted	01/06/2017 20:00
Method Blank ID	BLANK-53441	Analyzed	01/10/2017 17:50

Native Isomers	**Conc** ng/Kg	**EMPC** ng/Kg	**RL** ng/Kg	**Internal Standards**	**ng's Added**	**Percent Recovery**
2,3,7,8-TCDF	17	-----	3.8	2,3,7,8-TCDF-13C	2.00	62
Total TCDF	240	-----	3.8	2,3,7,8-TCDD-13C	2.00	75
				1,2,3,7,8-PeCDF-13C	2.00	55
2,3,7,8-TCDD	ND	-----	3.8	2,3,4,7,8-PeCDF-13C	2.00	57
Total TCDD	44	-----	3.8	1,2,3,7,8-PeCDD-13C	2.00	61
				1,2,3,4,7,8-HxCDF-13C	2.00	69
1,2,3,7,8-PeCDF	ND	-----	19.0	1,2,3,6,7,8-HxCDF-13C	2.00	64
2,3,4,7,8-PeCDF	ND	-----	19.0	2,3,4,6,7,8-HxCDF-13C	2.00	67
Total PeCDF	120	-----	19.0	1,2,3,7,8,9-HxCDF-13C	2.00	65
				1,2,3,4,7,8-HxCDD-13C	2.00	68
1,2,3,7,8-PeCDD	ND	-----	19.0	1,2,3,6,7,8-HxCDD-13C	2.00	54
Total PeCDD	29	-----	19.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	54
				1,2,3,4,7,8,9-HpCDF-13C	2.00	56
1,2,3,4,7,8-HxCDF	ND	-----	19.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	56
1,2,3,6,7,8-HxCDF	ND	-----	19.0	OCDD-13C	4.00	59
2,3,4,6,7,8-HxCDF	ND	-----	19.0			
1,2,3,7,8,9-HxCDF	ND	-----	19.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	70	-----	19.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	-----	19.0	2,3,7,8-TCDD-37Cl4	0.20	71
1,2,3,6,7,8-HxCDD	21	-----	19.0			
1,2,3,7,8,9-HxCDD	ND	-----	19.0			
Total HxCDD	220	-----	19.0			
1,2,3,4,6,7,8-HpCDF	91	-----	19.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	-----	19.0	Equivalence: 12 ng/Kg		
Total HpCDF	150	-----	19.0	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	310	-----	19.0			
Total HpCDD	650	-----	19.0			
OCDF	120	-----	38.0			
OCDD	12000	-----	38.0			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).
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Results reported on a dry weight basis and are valid to no more than 2 significant figures.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Method 8290 Sample Analysis Results

Client - Veritech

Client's Sample ID	AC95422-003		
Lab Sample ID	10374907003		
Filename	U170110A_09		
Injected By	SMT		
Total Amount Extracted	17.3 g	Matrix	Soil
% Moisture	81.7	Dilution	NA
Dry Weight Extracted	3.17 g	Collected	12/30/2016 12:30
ICAL ID	U161025	Received	01/04/2017 09:30
CCal Filename(s)	U170110A_01 & U170110A_17	Extracted	01/06/2017 20:00
Method Blank ID	BLANK-53441	Analyzed	01/10/2017 18:36

Native Isomers	**Conc** ng/Kg	**EMPC** ng/Kg	**RL** ng/Kg	**Internal Standards**	**ng's Added**	**Percent Recovery**
2,3,7,8-TCDF	8.4	-----	3.2	2,3,7,8-TCDF-13C	2.00	65
Total TCDF	75.0	-----	3.2	2,3,7,8-TCDD-13C	2.00	75
				1,2,3,7,8-PeCDF-13C	2.00	61
2,3,7,8-TCDD	ND	-----	3.2	2,3,4,7,8-PeCDF-13C	2.00	60
Total TCDD	5.2	-----	3.2	1,2,3,7,8-PeCDD-13C	2.00	63
				1,2,3,4,7,8-HxCDF-13C	2.00	76
1,2,3,7,8-PeCDF	ND	-----	16.0	1,2,3,6,7,8-HxCDF-13C	2.00	71
2,3,4,7,8-PeCDF	ND	-----	16.0	2,3,4,6,7,8-HxCDF-13C	2.00	74
Total PeCDF	70.0	-----	16.0	1,2,3,7,8,9-HxCDF-13C	2.00	77
				1,2,3,4,7,8-HxCDD-13C	2.00	74
1,2,3,7,8-PeCDD	ND	-----	16.0	1,2,3,6,7,8-HxCDD-13C	2.00	58
Total PeCDD	ND	-----	16.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	65
				1,2,3,4,7,8,9-HpCDF-13C	2.00	75
1,2,3,4,7,8-HxCDF	ND	-----	16.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	74
1,2,3,6,7,8-HxCDF	ND	-----	16.0	OCDD-13C	4.00	90
2,3,4,6,7,8-HxCDF	ND	-----	16.0			
1,2,3,7,8,9-HxCDF	ND	-----	16.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	69.0	-----	16.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	-----	16.0	2,3,7,8-TCDD-37Cl4	0.20	73
1,2,3,6,7,8-HxCDD	20.0	-----	16.0			
1,2,3,7,8,9-HxCDD	ND	-----	16.0			
Total HxCDD	160.0	-----	16.0			
1,2,3,4,6,7,8-HpCDF	100.0	-----	16.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	-----	16.0	Equivalence: 9.4 ng/Kg		
Total HpCDF	180.0	-----	16.0	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	320.0	-----	16.0			
Total HpCDD	690.0	-----	16.0			
OCDF	150.0	-----	32.0			
OCDD	7700.0	-----	32.0			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).
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RL = Reporting Limit

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NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Method 8290 Sample Analysis Results

Client - Veritech

Client's Sample ID	AC95422-004		
Lab Sample ID	10374907004		
Filename	U170110A_10		
Injected By	SMT		
Total Amount Extracted	17.2 g	Matrix	Soil
% Moisture	85.3	Dilution	NA
Dry Weight Extracted	2.53 g	Collected	12/30/2016 11:00
ICAL ID	U161025	Received	01/04/2017 09:30
CCal Filename(s)	U170110A_01 & U170110A_17	Extracted	01/06/2017 20:00
Method Blank ID	BLANK-53441	Analyzed	01/10/2017 19:22

Native Isomers	**Conc** ng/Kg	**EMPC** ng/Kg	**RL** ng/Kg	**Internal Standards**	**ng's Added**	**Percent Recovery**
2,3,7,8-TCDF	7.5	-----	4.0	2,3,7,8-TCDF-13C	2.00	62
Total TCDF	120.0	-----	4.0	2,3,7,8-TCDD-13C	2.00	73
				1,2,3,7,8-PeCDF-13C	2.00	59
2,3,7,8-TCDD	ND	-----	4.0	2,3,4,7,8-PeCDF-13C	2.00	57
Total TCDD	4.6	-----	4.0	1,2,3,7,8-PeCDD-13C	2.00	61
				1,2,3,4,7,8-HxCDF-13C	2.00	70
1,2,3,7,8-PeCDF	ND	-----	20.0	1,2,3,6,7,8-HxCDF-13C	2.00	66
2,3,4,7,8-PeCDF	ND	-----	20.0	2,3,4,6,7,8-HxCDF-13C	2.00	69
Total PeCDF	68.0	-----	20.0	1,2,3,7,8,9-HxCDF-13C	2.00	65
				1,2,3,4,7,8-HxCDD-13C	2.00	72
1,2,3,7,8-PeCDD	ND	-----	20.0	1,2,3,6,7,8-HxCDD-13C	2.00	56
Total PeCDD	ND	-----	20.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	53
				1,2,3,4,7,8,9-HpCDF-13C	2.00	54
1,2,3,4,7,8-HxCDF	ND	-----	20.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	54
1,2,3,6,7,8-HxCDF	ND	-----	20.0	OCDD-13C	4.00	45
2,3,4,6,7,8-HxCDF	ND	-----	20.0			
1,2,3,7,8,9-HxCDF	ND	-----	20.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	83.0	-----	20.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	-----	20.0	2,3,7,8-TCDD-37Cl4	0.20	71
1,2,3,6,7,8-HxCDD	ND	-----	20.0			
1,2,3,7,8,9-HxCDD	ND	-----	20.0			
Total HxCDD	100.0	-----	20.0			
1,2,3,4,6,7,8-HpCDF	83.0	-----	20.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	-----	20.0	Equivalence: 6.2 ng/Kg		
Total HpCDF	180.0	-----	20.0	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	300.0	-----	20.0			
Total HpCDD	590.0	-----	20.0			
OCDF	130.0	-----	40.0			
OCDD	5300.0	-----	40.0			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).
EMPC = Estimated Maximum Possible Concentration
RL = Reporting Limit

ND = Not Detected
NA = Not Applicable
NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Method 8290 Sample Analysis Results

Client - Veritech

Client's Sample ID	AC95422-005		
Lab Sample ID	10374907005-R		
Filename	F170117B_13		
Injected By	SMT		
Total Amount Extracted	30.3 g	Matrix	Soil
% Moisture	66.9	Dilution	NA
Dry Weight Extracted	10.0 g	Collected	12/30/2016 10:20
ICAL ID	F170111	Received	01/04/2017 09:30
CCal Filename(s)	F170117A_17 & F170117B_15	Extracted	01/13/2017 17:30
Method Blank ID	BLANK-53596	Analyzed	01/18/2017 11:43

Native Isomers	**Conc** ng/Kg	**EMPC** ng/Kg	**RL** ng/Kg		**Internal Standards**	**ng's Added**	**Percent Recovery**	
2,3,7,8-TCDF	30.0	-----	1.00		2,3,7,8-TCDF-13C	2.00	62	
Total TCDF	400.0	-----	1.00		2,3,7,8-TCDD-13C	2.00	81	
					1,2,3,7,8-PeCDF-13C	2.00	51	
2,3,7,8-TCDD	4.0	-----	1.00		2,3,4,7,8-PeCDF-13C	2.00	46	
Total TCDD	61.0	-----	1.00		1,2,3,7,8-PeCDD-13C	2.00	57	
					1,2,3,4,7,8-HxCDF-13C	2.00	80	
1,2,3,7,8-PeCDF	-----	16	5.00	P	1,2,3,6,7,8-HxCDF-13C	2.00	53	
2,3,4,7,8-PeCDF	59.0	-----	5.00		2,3,4,6,7,8-HxCDF-13C	2.00	56	
Total PeCDF	730.0	-----	5.00		1,2,3,7,8,9-HxCDF-13C	2.00	52	
					1,2,3,4,7,8-HxCDD-13C	2.00	73	
1,2,3,7,8-PeCDD	10.0	-----	5.00		1,2,3,6,7,8-HxCDD-13C	2.00	53	
Total PeCDD	100.0	-----	5.00		1,2,3,4,6,7,8-HpCDF-13C	2.00	32	R
					1,2,3,4,7,8,9-HpCDF-13C	2.00	29	R
1,2,3,4,7,8-HxCDF	58.0	-----	5.00		1,2,3,4,6,7,8-HpCDD-13C	2.00	36	R
1,2,3,6,7,8-HxCDF	31.0	-----	5.00		OCDD-13C	4.00	29	RY
2,3,4,6,7,8-HxCDF	42.0	-----	5.00					
1,2,3,7,8,9-HxCDF	17.0	-----	5.00		1,2,3,4-TCDD-13C	2.00	NA	
Total HxCDF	1900.0	-----	5.00		1,2,3,7,8,9-HxCDD-13C	2.00	NA	
1,2,3,4,7,8-HxCDD	12.0	-----	5.00		2,3,7,8-TCDD-37Cl4	0.20	75	
1,2,3,6,7,8-HxCDD	54.0	-----	5.00					
1,2,3,7,8,9-HxCDD	24.0	-----	5.00					
Total HxCDD	560.0	-----	5.00					
1,2,3,4,6,7,8-HpCDF	2400.0	-----	5.00		Total 2,3,7,8-TCDD			
1,2,3,4,7,8,9-HpCDF	37.0	-----	5.00		Equivalence: 110 ng/Kg			
Total HpCDF	4800.0	-----	5.00		(Lower-bound - Using 2005 WHO Factors)			
1,2,3,4,6,7,8-HpCDD	1800.0	-----	5.00					
Total HpCDD	3600.0	-----	5.00					
OCDF	1100.0	-----	10.00					
OCDD	22000.0	-----	10.00	E				

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).
EMPC = Estimated Maximum Possible Concentration
RL = Reporting Limit

ND = Not Detected
NA = Not Applicable
NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.
R = Recovery outside target range
P = PCDE Interference
E = Exceeds calibration range
Y = Calculated using average of daily RFs

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Method 8290 Sample Analysis Results

Client - Veritech

Client's Sample ID	AC95422-006		
Lab Sample ID	10374907006		
Filename	U170110A_11		
Injected By	SMT		
Total Amount Extracted	17.5 g	Matrix	Soil
% Moisture	65.8	Dilution	NA
Dry Weight Extracted	5.98 g	Collected	12/30/2016 10:10
ICAL ID	U161025	Received	01/04/2017 09:30
CCal Filename(s)	U170110A_01 & U170110A_17	Extracted	01/06/2017 20:00
Method Blank ID	BLANK-53441	Analyzed	01/10/2017 20:08

Native Isomers	**Conc** ng/Kg	**EMPC** ng/Kg	**RL** ng/Kg	**Internal Standards**	**ng's Added**	**Percent Recovery**
2,3,7,8-TCDF	16.0	-----	1.7	2,3,7,8-TCDF-13C	2.00	64
Total TCDF	140.0	-----	1.7	2,3,7,8-TCDD-13C	2.00	72
				1,2,3,7,8-PeCDF-13C	2.00	58
2,3,7,8-TCDD	3.9	-----	1.7	2,3,4,7,8-PeCDF-13C	2.00	58
Total TCDD	46.0	-----	1.7	1,2,3,7,8-PeCDD-13C	2.00	65
				1,2,3,4,7,8-HxCDF-13C	2.00	68
1,2,3,7,8-PeCDF	ND	-----	8.4	1,2,3,6,7,8-HxCDF-13C	2.00	62
2,3,4,7,8-PeCDF	12.0	-----	8.4	2,3,4,6,7,8-HxCDF-13C	2.00	65
Total PeCDF	150.0	-----	8.4	1,2,3,7,8,9-HxCDF-13C	2.00	60
				1,2,3,4,7,8-HxCDD-13C	2.00	68
1,2,3,7,8-PeCDD	ND	-----	8.4	1,2,3,6,7,8-HxCDD-13C	2.00	52
Total PeCDD	60.0	-----	8.4	1,2,3,4,6,7,8-HpCDF-13C	2.00	49
				1,2,3,4,7,8,9-HpCDF-13C	2.00	49
1,2,3,4,7,8-HxCDF	32.0	-----	8.4	1,2,3,4,6,7,8-HpCDD-13C	2.00	50
1,2,3,6,7,8-HxCDF	14.0	-----	8.4	OCDD-13C	4.00	41
2,3,4,6,7,8-HxCDF	14.0	-----	8.4			
1,2,3,7,8,9-HxCDF	ND	-----	8.4	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	230.0	-----	8.4	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	11.0	-----	8.4	2,3,7,8-TCDD-37Cl4	0.20	70
1,2,3,6,7,8-HxCDD	35.0	-----	8.4			
1,2,3,7,8,9-HxCDD	23.0	-----	8.4			
Total HxCDD	370.0	-----	8.4			
1,2,3,4,6,7,8-HpCDF	270.0	-----	8.4	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	12.0	-----	8.4	Equivalence: 37 ng/Kg		
Total HpCDF	440.0	-----	8.4	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	680.0	-----	8.4			
Total HpCDD	1600.0	-----	8.4			
OCDF	460.0	-----	17.0			
OCDD	16000.0	-----	17.0			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).
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ND = Not Detected
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NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Method 8290 Sample Analysis Results

Client - Veritech

Client's Sample ID	AC95422-007		
Lab Sample ID	10374907007		
Filename	U170110A_12		
Injected By	SMT		
Total Amount Extracted	16.9 g	Matrix	Soil
% Moisture	61.8	Dilution	NA
Dry Weight Extracted	6.46 g	Collected	12/30/2016 11:30
ICAL ID	U161025	Received	01/04/2017 09:30
CCal Filename(s)	U170110A_01 & U170110A_17	Extracted	01/06/2017 20:00
Method Blank ID	BLANK-53441	Analyzed	01/10/2017 20:54

Native Isomers	**Conc** ng/Kg	**EMPC** ng/Kg	**RL** ng/Kg	**Internal Standards**	**ng's Added**	**Percent Recovery**
2,3,7,8-TCDF	13.0	-----	1.5	2,3,7,8-TCDF-13C	2.00	67
Total TCDF	110.0	-----	1.5	2,3,7,8-TCDD-13C	2.00	74
				1,2,3,7,8-PeCDF-13C	2.00	61
2,3,7,8-TCDD	3.3	-----	1.5	2,3,4,7,8-PeCDF-13C	2.00	61
Total TCDD	26.0	-----	1.5	1,2,3,7,8-PeCDD-13C	2.00	66
				1,2,3,4,7,8-HxCDF-13C	2.00	70
1,2,3,7,8-PeCDF	ND	-----	7.7	1,2,3,6,7,8-HxCDF-13C	2.00	63
2,3,4,7,8-PeCDF	ND	-----	7.7	2,3,4,6,7,8-HxCDF-13C	2.00	69
Total PeCDF	66.0	-----	7.7	1,2,3,7,8,9-HxCDF-13C	2.00	65
				1,2,3,4,7,8-HxCDD-13C	2.00	70
1,2,3,7,8-PeCDD	ND	-----	7.7	1,2,3,6,7,8-HxCDD-13C	2.00	54
Total PeCDD	24.0	-----	7.7	1,2,3,4,6,7,8-HpCDF-13C	2.00	53
				1,2,3,4,7,8,9-HpCDF-13C	2.00	54
1,2,3,4,7,8-HxCDF	9.6	-----	7.7	1,2,3,4,6,7,8-HpCDD-13C	2.00	54
1,2,3,6,7,8-HxCDF	ND	-----	7.7	OCDD-13C	4.00	47
2,3,4,6,7,8-HxCDF	ND	-----	7.7			
1,2,3,7,8,9-HxCDF	ND	-----	7.7	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	73.0	-----	7.7	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	-----	7.7	2,3,7,8-TCDD-37Cl4	0.20	77
1,2,3,6,7,8-HxCDD	19.0	-----	7.7			
1,2,3,7,8,9-HxCDD	14.0	-----	7.7			
Total HxCDD	240.0	-----	7.7			
1,2,3,4,6,7,8-HpCDF	79.0	-----	7.7	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	-----	7.7	Equivalence: 15 ng/Kg		
Total HpCDF	150.0	-----	7.7	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	270.0	-----	7.7			
Total HpCDD	710.0	-----	7.7			
OCDF	130.0	-----	15.0			
OCDD	8500.0	-----	15.0			

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Method 8290 Sample Analysis Results

Client - Veritech

Client's Sample ID	AC95422-008		
Lab Sample ID	10374907008		
Filename	U170110A_13		
Injected By	SMT		
Total Amount Extracted	17.4 g	Matrix	Soil
% Moisture	66.1	Dilution	NA
Dry Weight Extracted	5.90 g	Collected	12/30/2016 13:30
ICAL ID	U161025	Received	01/04/2017 09:30
CCal Filename(s)	U170110A_01 & U170110A_17	Extracted	01/06/2017 20:00
Method Blank ID	BLANK-53441	Analyzed	01/10/2017 21:40

Native Isomers	**Conc** ng/Kg	**EMPC** ng/Kg	**RL** ng/Kg	**Internal Standards**	**ng's Added**	**Percent Recovery**
2,3,7,8-TCDF	18.0	-----	1.7	2,3,7,8-TCDF-13C	2.00	65
Total TCDF	140.0	-----	1.7	2,3,7,8-TCDD-13C	2.00	74
				1,2,3,7,8-PeCDF-13C	2.00	58
2,3,7,8-TCDD	4.4	-----	1.7	2,3,4,7,8-PeCDF-13C	2.00	58
Total TCDD	41.0	-----	1.7	1,2,3,7,8-PeCDD-13C	2.00	62
				1,2,3,4,7,8-HxCDF-13C	2.00	66
1,2,3,7,8-PeCDF	ND	-----	8.5	1,2,3,6,7,8-HxCDF-13C	2.00	60
2,3,4,7,8-PeCDF	ND	-----	8.5	2,3,4,6,7,8-HxCDF-13C	2.00	63
Total PeCDF	93.0	-----	8.5	1,2,3,7,8,9-HxCDF-13C	2.00	62
				1,2,3,4,7,8-HxCDD-13C	2.00	68
1,2,3,7,8-PeCDD	ND	-----	8.5	1,2,3,6,7,8-HxCDD-13C	2.00	53
Total PeCDD	54.0	-----	8.5	1,2,3,4,6,7,8-HpCDF-13C	2.00	50
				1,2,3,4,7,8,9-HpCDF-13C	2.00	52
1,2,3,4,7,8-HxCDF	12.0	-----	8.5	1,2,3,4,6,7,8-HpCDD-13C	2.00	55
1,2,3,6,7,8-HxCDF	ND	-----	8.5	OCDD-13C	4.00	49
2,3,4,6,7,8-HxCDF	ND	-----	8.5			
1,2,3,7,8,9-HxCDF	ND	-----	8.5	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	91.0	-----	8.5	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	-----	8.5	2,3,7,8-TCDD-37Cl4	0.20	70
1,2,3,6,7,8-HxCDD	24.0	-----	8.5			
1,2,3,7,8,9-HxCDD	17.0	-----	8.5			
Total HxCDD	330.0	-----	8.5			
1,2,3,4,6,7,8-HpCDF	110.0	-----	8.5	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	-----	8.5	Equivalence: 20 ng/Kg		
Total HpCDF	190.0	-----	8.5	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	370.0	-----	8.5			
Total HpCDD	990.0	-----	8.5			
OCDF	170.0	-----	17.0			
OCDD	12000.0	-----	17.0			

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NC = Not Calculated

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Method 8290 Sample Analysis Results

Client - Veritech

Client's Sample ID	AC95422-009		
Lab Sample ID	10374907009		
Filename	U170110A_14		
Injected By	SMT		
Total Amount Extracted	18.0 g	Matrix	Soil
% Moisture	82.8	Dilution	NA
Dry Weight Extracted	3.10 g	Collected	12/30/2016 13:45
ICAL ID	U161025	Received	01/04/2017 09:30
CCal Filename(s)	U170110A_01 & U170110A_17	Extracted	01/06/2017 20:00
Method Blank ID	BLANK-53441	Analyzed	01/10/2017 22:26

Native Isomers	**Conc** ng/Kg	**EMPC** ng/Kg	**RL** ng/Kg	**Internal Standards**	**ng's Added**	**Percent Recovery**
2,3,7,8-TCDF	7.6	-----	3.2	2,3,7,8-TCDF-13C	2.00	64
Total TCDF	80.0	-----	3.2	2,3,7,8-TCDD-13C	2.00	72
				1,2,3,7,8-PeCDF-13C	2.00	58
2,3,7,8-TCDD	ND	-----	3.2	2,3,4,7,8-PeCDF-13C	2.00	58
Total TCDD	9.6	-----	3.2	1,2,3,7,8-PeCDD-13C	2.00	64
				1,2,3,4,7,8-HxCDF-13C	2.00	69
1,2,3,7,8-PeCDF	ND	-----	16.0	1,2,3,6,7,8-HxCDF-13C	2.00	62
2,3,4,7,8-PeCDF	ND	-----	16.0	2,3,4,6,7,8-HxCDF-13C	2.00	63
Total PeCDF	58.0	-----	16.0	1,2,3,7,8,9-HxCDF-13C	2.00	65
				1,2,3,4,7,8-HxCDD-13C	2.00	67
1,2,3,7,8-PeCDD	ND	-----	16.0	1,2,3,6,7,8-HxCDD-13C	2.00	56
Total PeCDD	ND	-----	16.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	51
				1,2,3,4,7,8,9-HpCDF-13C	2.00	55
1,2,3,4,7,8-HxCDF	ND	-----	16.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	56
1,2,3,6,7,8-HxCDF	ND	-----	16.0	OCDD-13C	4.00	46
2,3,4,6,7,8-HxCDF	ND	-----	16.0			
1,2,3,7,8,9-HxCDF	ND	-----	16.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	66.0	-----	16.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	-----	16.0	2,3,7,8-TCDD-37Cl4	0.20	77
1,2,3,6,7,8-HxCDD	21.0	-----	16.0			
1,2,3,7,8,9-HxCDD	18.0	-----	16.0			
Total HxCDD	200.0	-----	16.0			
1,2,3,4,6,7,8-HpCDF	86.0	-----	16.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	-----	16.0	Equivalence: 12 ng/Kg		
Total HpCDF	170.0	-----	16.0	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	410.0	-----	16.0			
Total HpCDD	830.0	-----	16.0			
OCDF	130.0	-----	32.0			
OCDD	6700.0	-----	32.0			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).
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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Method 8290 Sample Analysis Results

Client - Veritech

Client's Sample ID	AC95422-010		
Lab Sample ID	10374907010		
Filename	U170110A_15		
Injected By	SMT		
Total Amount Extracted	17.2 g	Matrix	Soil
% Moisture	77.4	Dilution	NA
Dry Weight Extracted	3.89 g	Collected	12/30/2016 14:05
ICAL ID	U161025	Received	01/04/2017 09:30
CCal Filename(s)	U170110A_01 & U170110A_17	Extracted	01/06/2017 20:00
Method Blank ID	BLANK-53441	Analyzed	01/10/2017 23:12

Native Isomers	**Conc** ng/Kg	**EMPC** ng/Kg	**RL** ng/Kg	**Internal Standards**	**ng's Added**	**Percent Recovery**
2,3,7,8-TCDF	11.0	-----	2.6	2,3,7,8-TCDF-13C	2.00	65
Total TCDF	120.0	-----	2.6	2,3,7,8-TCDD-13C	2.00	73
				1,2,3,7,8-PeCDF-13C	2.00	59
2,3,7,8-TCDD	2.8	-----	2.6	2,3,4,7,8-PeCDF-13C	2.00	60
Total TCDD	19.0	-----	2.6	1,2,3,7,8-PeCDD-13C	2.00	64
				1,2,3,4,7,8-HxCDF-13C	2.00	71
1,2,3,7,8-PeCDF	ND	-----	13.0	1,2,3,6,7,8-HxCDF-13C	2.00	65
2,3,4,7,8-PeCDF	ND	-----	13.0	2,3,4,6,7,8-HxCDF-13C	2.00	68
Total PeCDF	34.0	-----	13.0	1,2,3,7,8,9-HxCDF-13C	2.00	68
				1,2,3,4,7,8-HxCDD-13C	2.00	70
1,2,3,7,8-PeCDD	ND	-----	13.0	1,2,3,6,7,8-HxCDD-13C	2.00	56
Total PeCDD	16.0	-----	13.0	1,2,3,4,6,7,8-HpCDF-13C	2.00	53
				1,2,3,4,7,8,9-HpCDF-13C	2.00	56
1,2,3,4,7,8-HxCDF	ND	-----	13.0	1,2,3,4,6,7,8-HpCDD-13C	2.00	56
1,2,3,6,7,8-HxCDF	ND	-----	13.0	OCDD-13C	4.00	53
2,3,4,6,7,8-HxCDF	ND	-----	13.0			
1,2,3,7,8,9-HxCDF	ND	-----	13.0	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	52.0	-----	13.0	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	-----	13.0	2,3,7,8-TCDD-37Cl4	0.20	75
1,2,3,6,7,8-HxCDD	22.0	-----	13.0			
1,2,3,7,8,9-HxCDD	28.0	-----	13.0			
Total HxCDD	260.0	-----	13.0			
1,2,3,4,6,7,8-HpCDF	80.0	-----	13.0	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	-----	13.0	Equivalence: 18 ng/Kg		
Total HpCDF	140.0	-----	13.0	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	450.0	-----	13.0			
Total HpCDD	1100.0	-----	13.0			
OCDF	130.0	-----	26.0			
OCDD	11000.0	-----	26.0			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).
EMPC = Estimated Maximum Possible Concentration
RL = Reporting Limit

ND = Not Detected
NA = Not Applicable
NC = Not Calculated

Results reported on a dry weight basis and are valid to no more than 2 significant figures.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Method 8290 Blank Analysis Results

Lab Sample ID	BLANK-53441	Matrix	Solid
Filename	U170110B_05	Dilution	NA
Total Amount Extracted	10.4 g	Extracted	01/06/2017 20:00
ICAL ID	U161025	Analyzed	01/11/2017 04:34
CCal Filename(s)	U170110A_17 & U170110B_09	Injected By	SMT

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	-----	0.96	2,3,7,8-TCDF-13C	2.00	64
Total TCDF	ND	-----	0.96	2,3,7,8-TCDD-13C	2.00	74
				1,2,3,7,8-PeCDF-13C	2.00	59
2,3,7,8-TCDD	ND	-----	0.96	2,3,4,7,8-PeCDF-13C	2.00	58
Total TCDD	ND	-----	0.96	1,2,3,7,8-PeCDD-13C	2.00	64
				1,2,3,4,7,8-HxCDF-13C	2.00	71
1,2,3,7,8-PeCDF	ND	-----	4.80	1,2,3,6,7,8-HxCDF-13C	2.00	70
2,3,4,7,8-PeCDF	ND	-----	4.80	2,3,4,6,7,8-HxCDF-13C	2.00	73
Total PeCDF	ND	-----	4.80	1,2,3,7,8,9-HxCDF-13C	2.00	63
				1,2,3,4,7,8-HxCDD-13C	2.00	76
1,2,3,7,8-PeCDD	ND	-----	4.80	1,2,3,6,7,8-HxCDD-13C	2.00	64
Total PeCDD	ND	-----	4.80	1,2,3,4,6,7,8-HpCDF-13C	2.00	60
				1,2,3,4,7,8,9-HpCDF-13C	2.00	56
1,2,3,4,7,8-HxCDF	ND	-----	4.80	1,2,3,4,6,7,8-HpCDD-13C	2.00	60
1,2,3,6,7,8-HxCDF	ND	-----	4.80	OCDD-13C	4.00	60 Y
2,3,4,6,7,8-HxCDF	ND	-----	4.80			
1,2,3,7,8,9-HxCDF	ND	-----	4.80	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	-----	4.80	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	-----	4.80	2,3,7,8-TCDD-37Cl4	0.20	71
1,2,3,6,7,8-HxCDD	ND	-----	4.80			
1,2,3,7,8,9-HxCDD	ND	-----	4.80			
Total HxCDD	ND	-----	4.80			
1,2,3,4,6,7,8-HpCDF	ND	-----	4.80	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	-----	4.80	Equivalence: 0.00 ng/Kg		
Total HpCDF	ND	-----	4.80	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	ND	-----	4.80			
Total HpCDD	ND	-----	4.80			
OCDF	ND	-----	9.60			
OCDD	ND	-----	9.60			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).
EMPC = Estimated Maximum Possible Concentration
RL = Reporting Limit

Results reported on a total weight basis and are valid to no more than 2 significant figures.
Y = Calculated using average of daily RFs

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Method 8290 Blank Analysis Results

Lab Sample ID	BLANK-53596	Matrix	Solid
Filename	F170117B_12	Dilution	NA
Total Amount Extracted	20.3 g	Extracted	01/13/2017 17:30
ICAL ID	F170111	Analyzed	01/18/2017 10:55
CCal Filename(s)	F170117A_17 & F170117B_15	Injected By	SMT

Native Isomers	Conc ng/Kg	EMPC ng/Kg	RL ng/Kg	Internal Standards	ng's Added	Percent Recovery
2,3,7,8-TCDF	ND	-----	0.49	2,3,7,8-TCDF-13C	2.00	68
Total TCDF	ND	-----	0.49	2,3,7,8-TCDD-13C	2.00	90
				1,2,3,7,8-PeCDF-13C	2.00	73
2,3,7,8-TCDD	ND	-----	0.49	2,3,4,7,8-PeCDF-13C	2.00	69
Total TCDD	ND	-----	0.49	1,2,3,7,8-PeCDD-13C	2.00	85
				1,2,3,4,7,8-HxCDF-13C	2.00	61
1,2,3,7,8-PeCDF	ND	-----	2.50	1,2,3,6,7,8-HxCDF-13C	2.00	68
2,3,4,7,8-PeCDF	ND	-----	2.50	2,3,4,6,7,8-HxCDF-13C	2.00	67
Total PeCDF	ND	-----	2.50	1,2,3,7,8,9-HxCDF-13C	2.00	67
				1,2,3,4,7,8-HxCDD-13C	2.00	66
1,2,3,7,8-PeCDD	ND	-----	2.50	1,2,3,6,7,8-HxCDD-13C	2.00	67
Total PeCDD	ND	-----	2.50	1,2,3,4,6,7,8-HpCDF-13C	2.00	58
				1,2,3,4,7,8,9-HpCDF-13C	2.00	53
1,2,3,4,7,8-HxCDF	ND	-----	2.50	1,2,3,4,6,7,8-HpCDD-13C	2.00	64
1,2,3,6,7,8-HxCDF	ND	-----	2.50	OCDD-13C	4.00	57 Y
2,3,4,6,7,8-HxCDF	ND	-----	2.50			
1,2,3,7,8,9-HxCDF	ND	-----	2.50	1,2,3,4-TCDD-13C	2.00	NA
Total HxCDF	ND	-----	2.50	1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	ND	-----	2.50	2,3,7,8-TCDD-37Cl4	0.20	89
1,2,3,6,7,8-HxCDD	ND	-----	2.50			
1,2,3,7,8,9-HxCDD	ND	-----	2.50			
Total HxCDD	ND	-----	2.50			
1,2,3,4,6,7,8-HpCDF	ND	-----	2.50	Total 2,3,7,8-TCDD		
1,2,3,4,7,8,9-HpCDF	ND	-----	2.50	Equivalence: 0.00 ng/Kg		
Total HpCDF	ND	-----	2.50	(Lower-bound - Using 2005 WHO Factors)		
1,2,3,4,6,7,8-HpCDD	ND	-----	2.50			
Total HpCDD	ND	-----	2.50			
OCDF	ND	-----	4.90			
OCDD	ND	-----	4.90			

Conc = Concentration (Totals include 2,3,7,8-substituted isomers).
EMPC = Estimated Maximum Possible Concentration
RL = Reporting Limit

Results reported on a total weight basis and are valid to no more than 2 significant figures.
Y = Calculated using average of daily RFs

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Method 8290 Laboratory Control Spike Results

Lab Sample ID	LCS-53442		
Filename	Y170111A_02	Matrix	Solid
Total Amount Extracted	10.2 g	Dilution	NA
ICAL ID	Y170109	Extracted	01/06/2017 20:00
CCal Filename(s)	Y170111A_01 & Y170111A_03	Analyzed	01/11/2017 12:14
Method Blank ID	BLANK-53441	Injected By	SMT

Native Isomers	**Qs** (ng)	**Qm** (ng)	% Rec.	**Internal Standards**	**ng's Added**	**Percent Recovery**
2,3,7,8-TCDF	0.20	0.20	102	2,3,7,8-TCDF-13C	2.0	48
Total TCDF				2,3,7,8-TCDD-13C	2.0	61
				1,2,3,7,8-PeCDF-13C	2.0	59
2,3,7,8-TCDD	0.20	0.16	82	2,3,4,7,8-PeCDF-13C	2.0	61
Total TCDD				1,2,3,7,8-PeCDD-13C	2.0	72
				1,2,3,4,7,8-HxCDF-13C	2.0	55
1,2,3,7,8-PeCDF	1.0	1.1	106	1,2,3,6,7,8-HxCDF-13C	2.0	64
2,3,4,7,8-PeCDF	1.0	1.1	110	2,3,4,6,7,8-HxCDF-13C	2.0	68
Total PeCDF				1,2,3,7,8,9-HxCDF-13C	2.0	64
				1,2,3,4,7,8-HxCDD-13C	2.0	64
1,2,3,7,8-PeCDD	1.0	0.94	94	1,2,3,6,7,8-HxCDD-13C	2.0	64
Total PeCDD				1,2,3,4,6,7,8-HpCDF-13C	2.0	69
				1,2,3,4,7,8,9-HpCDF-13C	2.0	72
1,2,3,4,7,8-HxCDF	1.0	1.1	110	1,2,3,4,6,7,8-HpCDD-13C	2.0	78
1,2,3,6,7,8-HxCDF	1.0	1.1	105	OCDD-13C	4.0	69
2,3,4,6,7,8-HxCDF	1.0	0.99	99			
1,2,3,7,8,9-HxCDF	1.0	0.98	98	1,2,3,4-TCDD-13C	2.0	NA
Total HxCDF				1,2,3,7,8,9-HxCDD-13C	2.0	NA
1,2,3,4,7,8-HxCDD	1.0	1.1	107	2,3,7,8-TCDD-37Cl4	0.20	58
1,2,3,6,7,8-HxCDD	1.0	1.0	104			
1,2,3,7,8,9-HxCDD	1.0	1.00	100			
Total HxCDD						
1,2,3,4,6,7,8-HpCDF	1.0	1.1	110			
1,2,3,4,7,8,9-HpCDF	1.0	0.97	97			
Total HpCDF						
1,2,3,4,6,7,8-HpCDD	1.0	0.94	94			
Total HpCDD						
OCDF	2.0	2.2	111			
OCDD	2.0	2.2	109			

Qs = Quantity Spiked
Qm = Quantity Measured
Rec. = Recovery (Expressed as Percent)
R = Recovery outside of target range
Y = RF averaging used in calculations
Nn = Value obtained from additional analysis
NA = Not Applicable
* = See Discussion

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Method 8290 Laboratory Control Spike Results

Lab Sample ID	LCS-53597		
Filename	F170117B_14	Matrix	Solid
Total Amount Extracted	20.1 g	Dilution	NA
ICAL ID	F170111	Extracted	01/13/2017 17:30
CCal Filename(s)	F170117A_17 & F170117B_15	Analyzed	01/18/2017 12:30
Method Blank ID	BLANK-53596	Injected By	SMT

Native Isomers	Qs (ng)	Qm (ng)	% Rec.	Internal Standards	ng's Added	Percent Recovery	
2,3,7,8-TCDF	0.20	0.20	102	2,3,7,8-TCDF-13C	2.0	68	
Total TCDF				2,3,7,8-TCDD-13C	2.0	90	
				1,2,3,7,8-PeCDF-13C	2.0	75	
2,3,7,8-TCDD	0.20	0.16	80	2,3,4,7,8-PeCDF-13C	2.0	67	
Total TCDD				1,2,3,7,8-PeCDD-13C	2.0	85	
				1,2,3,4,7,8-HxCDF-13C	2.0	68	
1,2,3,7,8-PeCDF	1.0	0.99	99	1,2,3,6,7,8-HxCDF-13C	2.0	68	
2,3,4,7,8-PeCDF	1.0	1.1	105	2,3,4,6,7,8-HxCDF-13C	2.0	70	
Total PeCDF				1,2,3,7,8,9-HxCDF-13C	2.0	70	
				1,2,3,4,7,8-HxCDD-13C	2.0	78	
1,2,3,7,8-PeCDD	1.0	0.95	95	1,2,3,6,7,8-HxCDD-13C	2.0	67	
Total PeCDD				1,2,3,4,6,7,8-HpCDF-13C	2.0	57	
				1,2,3,4,7,8,9-HpCDF-13C	2.0	53	
1,2,3,4,7,8-HxCDF	1.0	1.1	109	1,2,3,4,6,7,8-HpCDD-13C	2.0	63	
1,2,3,6,7,8-HxCDF	1.0	1.0	104	OCDD-13C	4.0	50	Y
2,3,4,6,7,8-HxCDF	1.0	0.95	95				
1,2,3,7,8,9-HxCDF	1.0	0.98	98	1,2,3,4-TCDD-13C	2.0	NA	
Total HxCDF				1,2,3,7,8,9-HxCDD-13C	2.0	NA	
1,2,3,4,7,8-HxCDD	1.0	1.0	101	2,3,7,8-TCDD-37Cl4	0.20	88	
1,2,3,6,7,8-HxCDD	1.0	1.1	114				
1,2,3,7,8,9-HxCDD	1.0	1.1	108				
Total HxCDD							
1,2,3,4,6,7,8-HpCDF	1.0	0.99	99				
1,2,3,4,7,8,9-HpCDF	1.0	0.98	98				
Total HpCDF							
1,2,3,4,6,7,8-HpCDD	1.0	0.92	92				
Total HpCDD							
OCDF	2.0	2.0	99				
OCDD	2.0	2.1	104				

Qs = Quantity Spiked
Qm = Quantity Measured
Rec. = Recovery (Expressed as Percent)
R = Recovery outside of target range

Y = RF averaging used in calculations
Nn = Value obtained from additional analysis
NA = Not Applicable
* = See Discussion

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Method 8290 Spiked Sample Report

Client - Veritech

Client's Sample ID	AC95422-001-MS		
Lab Sample ID	10374907001-MS		
Filename	U170110B_02	Matrix	Soil
Total Amount Extracted	16.7 g	Dilution	NA
ICAL ID	U161025	Extracted	01/06/2017 20:00
CCal Filename(s)	U170110A_17 & U170110B_09	Analyzed	01/11/2017 02:17
Method Blank ID	BLANK-53441	Injected By	SMT

Native Isomers	**Qs** (ng)	**Qm** (ng)	% Rec.	**Internal Standards**	**ng's Added**	**Percent Recovery**
2,3,7,8-TCDF	0.20	0.23	117	2,3,7,8-TCDF-13C	2.00	62
				2,3,7,8-TCDD-13C	2.00	69
				1,2,3,7,8-PeCDF-13C	2.00	56
2,3,7,8-TCDD	0.20	0.18	92	2,3,4,7,8-PeCDF-13C	2.00	56
				1,2,3,7,8-PeCDD-13C	2.00	60
				1,2,3,4,7,8-HxCDF-13C	2.00	68
1,2,3,7,8-PeCDF	1.00	1.02	102	1,2,3,6,7,8-HxCDF-13C	2.00	66
2,3,4,7,8-PeCDF	1.00	1.04	104	2,3,4,6,7,8-HxCDF-13C	2.00	68
				1,2,3,7,8,9-HxCDF-13C	2.00	64
				1,2,3,4,7,8-HxCDD-13C	2.00	69
1,2,3,7,8-PeCDD	1.00	0.99	99	1,2,3,6,7,8-HxCDD-13C	2.00	56
				1,2,3,4,6,7,8-HpCDF-13C	2.00	51
				1,2,3,4,7,8,9-HpCDF-13C	2.00	51
1,2,3,4,7,8-HxCDF	1.00	1.07	107	1,2,3,4,6,7,8-HpCDD-13C	2.00	54
1,2,3,6,7,8-HxCDF	1.00	1.01	101	OCDD-13C	4.00	57 Y
2,3,4,6,7,8-HxCDF	1.00	0.97	97			
1,2,3,7,8,9-HxCDF	1.00	0.96	96	1,2,3,4-TCDD-13C	2.00	NA
				1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	1.00	1.17	117	2,3,7,8-TCDD-37Cl4	0.20	75
1,2,3,6,7,8-HxCDD	1.00	1.18	118			
1,2,3,7,8,9-HxCDD	1.00	1.11	111			
1,2,3,4,6,7,8-HpCDF	1.00	1.27	127			
1,2,3,4,7,8,9-HpCDF	1.00	1.00	100			
1,2,3,4,6,7,8-HpCDD	1.00	1.61	161			
OCDF	2.00	2.04	102			
OCDD	2.00	18.35	917			

Qs = Quantity Spiked Qm = Quantity Measured Rec. = Recovery (Expressed as Percent)

Results reported on a dry weight basis and are valid to no more than 2 significant figures.
Y = Calculated using average of daily RFs

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Method 8290 Spiked Sample Report

Client - Veritech

Client's Sample ID	AC95422-001-MSD		
Lab Sample ID	10374907001-MSD		
Filename	U170110B_03	Matrix	Soil
Total Amount Extracted	16.5 g	Dilution	NA
ICAL ID	U161025	Extracted	01/06/2017 20:00
CCal Filename(s)	U170110A_17 & U170110B_09	Analyzed	01/11/2017 03:03
Method Blank ID	BLANK-53441	Injected By	SMT

Native Isomers	**Qs** (ng)	**Qm** (ng)	% Rec.	**Internal Standards**	**ng's Added**	**Percent Recovery**
2,3,7,8-TCDF	0.20	0.23	114	2,3,7,8-TCDF-13C	2.00	64
				2,3,7,8-TCDD-13C	2.00	72
				1,2,3,7,8-PeCDF-13C	2.00	56
2,3,7,8-TCDD	0.20	0.19	97	2,3,4,7,8-PeCDF-13C	2.00	55
				1,2,3,7,8-PeCDD-13C	2.00	62
				1,2,3,4,7,8-HxCDF-13C	2.00	64
1,2,3,7,8-PeCDF	1.00	1.01	101	1,2,3,6,7,8-HxCDF-13C	2.00	62
2,3,4,7,8-PeCDF	1.00	1.03	103	2,3,4,6,7,8-HxCDF-13C	2.00	64
				1,2,3,7,8,9-HxCDF-13C	2.00	63
				1,2,3,4,7,8-HxCDD-13C	2.00	69
1,2,3,7,8-PeCDD	1.00	1.04	104	1,2,3,6,7,8-HxCDD-13C	2.00	57
				1,2,3,4,6,7,8-HpCDF-13C	2.00	48
				1,2,3,4,7,8,9-HpCDF-13C	2.00	52
1,2,3,4,7,8-HxCDF	1.00	1.05	105	1,2,3,4,6,7,8-HpCDD-13C	2.00	53
1,2,3,6,7,8-HxCDF	1.00	0.97	97	OCDD-13C	4.00	61 Y
2,3,4,6,7,8-HxCDF	1.00	0.97	97			
1,2,3,7,8,9-HxCDF	1.00	0.94	94	1,2,3,4-TCDD-13C	2.00	NA
				1,2,3,7,8,9-HxCDD-13C	2.00	NA
1,2,3,4,7,8-HxCDD	1.00	1.13	113	2,3,7,8-TCDD-37Cl4	0.20	69
1,2,3,6,7,8-HxCDD	1.00	1.22	122			
1,2,3,7,8,9-HxCDD	1.00	1.09	109			
1,2,3,4,6,7,8-HpCDF	1.00	1.33	133			
1,2,3,4,7,8,9-HpCDF	1.00	1.08	108			
1,2,3,4,6,7,8-HpCDD	1.00	1.54	154			
OCDF	2.00	2.21	111			
OCDD	2.00	13.84	692			

Qs = Quantity Spiked Qm = Quantity Measured Rec. = Recovery (Expressed as Percent)

Results reported on a dry weight basis and are valid to no more than 2 significant figures.
Y = Calculated using average of daily RFs

REPORT OF LABORATORY ANALYSIS

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1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Method 8290 Spike Sample Results

Client - Veritech

Client Sample ID	AC95422-001			Dry Weights	
Lab Sample ID	10374907001	Sample Filename	U170110B_06	Sample Amount	2.95 g
MS ID	10374907001-MS	MS Filename	U170110B_02	MS Amount	3.0 g
MSD ID	10374907001-MSD	MSD Filename	U170110B_03	MSD Amount	3.0 g

Analyte	Sample Conc. ng/Kg	MS/MSD Qs (ng)	MS Qm (ng)	MSD Qm (ng)	RPD	Background Subtracted MS % Rec.	MSD % Rec.	RPD
2,3,7,8-TCDF	5.439	0.20	0.23	0.23	2.0	108	106	2.1
2,3,7,8-TCDD	0.000	0.20	0.18	0.19	5.0	92	97	5.0
1,2,3,7,8-PeCDF	0.000	1.00	1.02	1.01	0.2	102	101	0.2
2,3,4,7,8-PeCDF	0.000	1.00	1.04	1.03	1.1	103	102	1.1
1,2,3,7,8-PeCDD	0.000	1.00	0.99	1.04	4.5	99	104	4.5
1,2,3,4,7,8-HxCDF	0.000	1.00	1.07	1.05	1.9	107	105	1.9
1,2,3,6,7,8-HxCDF	0.000	1.00	1.01	0.97	3.9	101	97	3.9
2,3,4,6,7,8-HxCDF	0.000	1.00	0.97	0.97	0.8	95	96	0.8
1,2,3,7,8,9-HxCDF	0.000	1.00	0.96	0.94	2.3	96	94	2.3
1,2,3,4,7,8-HxCDD	0.000	1.00	1.17	1.13	3.8	116	112	3.9
1,2,3,6,7,8-HxCDD	0.000	1.00	1.18	1.22	3.7	116	120	3.8
1,2,3,7,8,9-HxCDD	0.000	1.00	1.11	1.09	1.5	111	109	1.5
1,2,3,4,6,7,8-HpCDF	32.647	1.00	1.27	1.33	4.0	118	123	4.4
1,2,3,4,7,8,9-HpCDF	0.000	1.00	1.00	1.08	7.2	100	108	7.2
1,2,3,4,6,7,8-HpCDD	134.860	1.00	1.61	1.54	5.0	121	114	6.2
OCDF	36.956	2.00	2.04	2.21	8.2	96	105	8.7
OCDD	3233.071	2.00	18.35	13.84	28.0	434	215	67.7

Definitions

MS = Matrix Spike
MSD = Matrix Spike Duplicate
Qm = Quantity Measured
Qs = Quantity Spiked
% Rec. = Percent Recovery
RPD = Relative Percent Difference
NA = Not Applicable
NC = Not Calculated

CDD = Chlorinated dibenzo-p-dioxin
CDF = Chlorinated dibenzo-p-furan
T = Tetra
Pe = Penta
Hx = Hexa
Hp = Hepta
O = Octa

Hampton-Clarke Report Of Analysis

Client: HDR **HC Project #:** 6123013

Project: Evergreen -Whale Creek

Sample ID: WCSB01 **Collection Date: 12/30/2016**
Lab#: AC95422-001 **Receipt Date: 12/30/2016**
Matrix: Soil/Encore

% Solids SM2540G

Analyte	DF	Units	RL	Result
% Solids	**1**	**percent**		**16**

Cyanide (Soil/Waste) 9012B

Analyte	DF	Units	RL	Result
Cyanide	1	mg/kg	1.5	ND

Mercury (Soil/Waste) 7471B

Analyte	DF	Units	RL	Result
Mercury	1	mg/kg	0.52	ND

Organochlorine Pesticides 8081

Analyte	DF	Units	RL	Result
a-Chlordane	1	mg/kg	0.031	ND
Aldrin	1	mg/kg	0.031	ND
Alpha-BHC	1	mg/kg	0.0063	ND
beta-BHC	1	mg/kg	0.0063	ND
Chlordane (Total)	1	mg/kg	0.031	ND
delta-BHC	1	mg/kg	0.031	ND
Dieldrin	1	mg/kg	0.0063	ND
Endosulfan I	1	mg/kg	0.031	ND
Endosulfan II	1	mg/kg	0.031	ND
Endosulfan Sulfate	1	mg/kg	0.031	ND
Endrin	1	mg/kg	0.031	ND
Endrin Aldehyde	1	mg/kg	0.031	ND
Endrin Ketone	1	mg/kg	0.031	ND
gamma-BHC	1	mg/kg	0.0063	ND
Heptachlor	1	mg/kg	0.031	ND
Heptachlor Epoxide	1	mg/kg	0.031	ND
Methoxychlor	1	mg/kg	0.031	ND
p,p'-DDD	1	mg/kg	0.016	ND
p,p'-DDE	1	mg/kg	0.016	ND
p,p'-DDT	1	mg/kg	0.016	ND
Toxaphene	1	mg/kg	0.16	ND
y-Chlordane	1	mg/kg	0.031	ND

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
TCMX-Surrogate	105.44	100	37	141	105	
TCMX-Surrogate	103.35	100	37	141	103	
DCB-Surrogate	99.89	100	33	146	100	
DCB-Surrogate	95.57	100	33	146	96	

pH 9040C/9045D

Analyte	DF	Units	RL	Result
pH	**1**	**ph**		**6.3**

Semivolatile Organics + 15 (8270)

Analyte	DF	Units	RL	Result
1,1'-Biphenyl	1	mg/kg	0.21	ND
1,2,4,5-Tetrachlorobenzene	1	mg/kg	0.21	ND
2,3,4,6-Tetrachlorophenol	1	mg/kg	0.21	ND
2,4,5-Trichlorophenol	1	mg/kg	0.21	ND
2,4,6-Trichlorophenol	1	mg/kg	0.21	ND
2,4-Dichlorophenol	1	mg/kg	0.052	ND
2,4-Dimethylphenol	1	mg/kg	0.052	ND
2,4-Dinitrophenol	1	mg/kg	1.0	ND
2,4-Dinitrotoluene	1	mg/kg	0.21	ND
2,6-Dinitrotoluene	1	mg/kg	0.21	ND

2-Chloronaphthalene	1	mg/kg	0.21	ND
2-Chlorophenol	1	mg/kg	0.21	ND
2-Methylnaphthalene	1	mg/kg	0.21	ND
2-Methylphenol	1	mg/kg	0.052	ND
2-Nitroaniline	1	mg/kg	0.21	ND
2-Nitrophenol	1	mg/kg	0.21	ND
3&4-Methylphenol	1	mg/kg	0.052	ND
3,3'-Dichlorobenzidine	1	mg/kg	0.21	ND
3-Nitroaniline	1	mg/kg	0.21	ND
4,6-Dinitro-2-methylphenol	1	mg/kg	1.0	ND
4-Bromophenyl-phenylether	1	mg/kg	0.21	ND
4-Chloro-3-methylphenol	1	mg/kg	0.21	ND
4-Chloroaniline	1	mg/kg	0.052	ND
4-Chlorophenyl-phenylether	1	mg/kg	0.21	ND
4-Nitroaniline	1	mg/kg	0.21	ND
4-Nitrophenol	1	mg/kg	0.21	ND
Acenaphthene	1	mg/kg	0.21	ND
Acenaphthylene	1	mg/kg	0.21	ND
Acetophenone	1	mg/kg	0.21	ND
Anthracene	1	mg/kg	0.21	ND
Atrazine	1	mg/kg	0.21	ND
Benzaldehyde	1	mg/kg	0.21	ND
Benzo[a]anthracene	1	mg/kg	0.21	ND
Benzo[a]pyrene	1	mg/kg	0.21	ND
Benzo[b]fluoranthene	1	mg/kg	0.21	ND
Benzo[g,h,i]perylene	1	mg/kg	0.21	ND
Benzo[k]fluoranthene	1	mg/kg	0.21	ND
bis(2-Chloroethoxy)methane	1	mg/kg	0.21	ND
bis(2-Chloroethyl)ether	1	mg/kg	0.052	ND
bis(2-Chloroisopropyl)ether	1	mg/kg	0.21	ND
bis(2-Ethylhexyl)phthalate	1	mg/kg	0.21	ND
Butylbenzylphthalate	1	mg/kg	0.21	ND
Caprolactam	1	mg/kg	0.21	ND
Carbazole	1	mg/kg	0.21	ND
Chrysene	1	mg/kg	0.21	ND
Dibenzo[a,h]anthracene	1	mg/kg	0.21	ND
Dibenzofuran	1	mg/kg	0.052	ND
Diethylphthalate	1	mg/kg	0.21	ND
Dimethylphthalate	1	mg/kg	0.21	ND
Di-n-butylphthalate	1	mg/kg	0.052	ND
Di-n-octylphthalate	1	mg/kg	0.21	ND
Fluoranthene	1	mg/kg	0.21	ND
Fluorene	1	mg/kg	0.21	ND
Hexachlorobenzene	1	mg/kg	0.21	ND
Hexachlorobutadiene	1	mg/kg	0.21	ND
Hexachlorocyclopentadiene	1	mg/kg	0.49	ND
Hexachloroethane	1	mg/kg	0.21	ND
Indeno[1,2,3-cd]pyrene	1	mg/kg	0.21	ND
Isophorone	1	mg/kg	0.21	ND
Naphthalene	1	mg/kg	0.052	ND
Nitrobenzene	1	mg/kg	0.21	ND
N-Nitroso-di-n-propylamine	1	mg/kg	0.052	ND
N-Nitrosodiphenylamine	1	mg/kg	0.21	ND
Pentachlorophenol	1	mg/kg	1.0	ND
Phenanthrene	1	mg/kg	0.21	ND
Phenol	1	mg/kg	0.21	ND
Pyrene	1	mg/kg	0.21	ND

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
Terphenyl-d14	26.83	50	58	148	54	Sb8
Phenol-d5	66.59	100	49	129	67	
Nitrobenzene-d5	21.43	50	52	129	43	Sb8
2-Fluorophenol	64.39	100	43	128	64	
2-Fluorobiphenyl	21.40	50	58	125	43	Sb8
2,4,6-Tribromophenol	56.42	100	54	145	56	

Semivolatile Organics + 15 (8270) Library Searches

Analyte	DF	Units	RT	Result
Tritetracontane	**1**	**mg/kg**	**12.73**	**1.3J**
Heptacosane	**1**	**mg/kg**	**13.49**	**1.9J**

Eicosane	**1**	**mg/kg**	**14.21**	**2.0J**
Heptadecane, 9-octyl-	**1**	**mg/kg**	**15**	**1.2J**
Vitamin E	**1**	**mg/kg**	**15.24**	**1.3J**
1a,11b-Dihydrobenz[5,6]anthra[1,2-b]azi	**1**	**mg/kg**	**15.31**	**1.2J**
Octadecanal	**1**	**mg/kg**	**15.72**	**1.1J**
unknown	**1**	**mg/kg**	**15.93**	**1.6J**
unknown	**1**	**mg/kg**	**16.07**	**2.0J**
Stigmast-5-en-3-ol, (3.beta.,24S)-	**1**	**mg/kg**	**16.41**	**5.8J**
1,2-Propanediol	**1**	**mg/kg**	**3.08**	**1.1J**
unknown	**1**	**mg/kg**	**4.08**	**5.2JB**
2-Pentanone, 4-hydroxy-4-methyl-	**1**	**mg/kg**	**4.42**	**140JAB**
unknown	**1**	**mg/kg**	**5.07**	**1.1JB**
.beta.-Eudesmol	**1**	**mg/kg**	**9.13**	**0.94J**
TotalSemiVolatileTic	**1**	**mg/kg**	**NA**	**170J**

TAL Metals 6010

Analyte	DF	Units	RL	Result
Aluminum	**1**	**mg/kg**	**1200**	**27000**
Barium	1	mg/kg	62	ND
Calcium	**1**	**mg/kg**	**6200**	**8400**
Chromium	**1**	**mg/kg**	**31**	**58**
Cobalt	**1**	**mg/kg**	**16**	**28**
Copper	**1**	**mg/kg**	**31**	**120**
Iron	**1**	**mg/kg**	**1200**	**37000**
Lead	**1**	**mg/kg**	**31**	**84**
Magnesium	**1**	**mg/kg**	**3100**	**8700**
Manganese	**1**	**mg/kg**	**62**	**660**
Nickel	**1**	**mg/kg**	**31**	**59**
Potassium	**1**	**mg/kg**	**3100**	**5600**
Sodium	**1**	**mg/kg**	**1600**	**29000**
Vanadium	**1**	**mg/kg**	**62**	**72**
Zinc	**1**	**mg/kg**	**62**	**310**

TAL Metals 6020

Analyte	DF	Units	RL	Result
Antimony	1	mg/kg	5.0	ND
Arsenic	**1**	**mg/kg**	**1.2**	**35**
Beryllium	**1**	**mg/kg**	**1.2**	**5.9**
Cadmium	1	mg/kg	2.5	ND
Selenium	**1**	**mg/kg**	**13**	**16**
Silver	1	mg/kg	1.2	ND
Thallium	1	mg/kg	2.5	ND

TOC (Region II/Kahn)

Analyte	DF	Units	RL	Result
Total Organic Carbon	**1**	**mg/kg**	**8100**	**360000**

Volatile Organics + 15 (8260)

Analyte	DF	Units	RL	Result
1,1,1-Trichloroethane	1.56	mg/kg	0.019	ND
1,1,2,2-Tetrachloroethane	1.56	mg/kg	0.019	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	1.56	mg/kg	0.019	ND
1,1,2-Trichloroethane	1.56	mg/kg	0.019	ND
1,1-Dichloroethane	1.56	mg/kg	0.019	ND
1,1-Dichloroethene	1.56	mg/kg	0.019	ND
1,2,3-Trichlorobenzene	1.56	mg/kg	0.019	ND
1,2,4-Trichlorobenzene	1.56	mg/kg	0.019	ND
1,2-Dibromo-3-chloropropane	1.56	mg/kg	0.019	ND
1,2-Dibromoethane	1.56	mg/kg	0.0097	ND
1,2-Dichlorobenzene	1.56	mg/kg	0.019	ND
1,2-Dichloroethane	1.56	mg/kg	0.019	ND
1,2-Dichloropropane	1.56	mg/kg	0.019	ND
1,3-Dichlorobenzene	1.56	mg/kg	0.019	ND
1,4-Dichlorobenzene	1.56	mg/kg	0.019	ND
1,4-Dioxane	1.56	mg/kg	0.97	ND
2-Butanone	1.56	mg/kg	0.019	ND
2-Hexanone	1.56	mg/kg	0.019	ND
4-Methyl-2-pentanone	1.56	mg/kg	0.019	ND

Sample ID: WCSB01 **Collection Date: 12/30/2016**
Lab#: AC95422-001 **Receipt Date: 12/30/2016**
Matrix: Soil/Encore

Acetone	1.56	mg/kg	0.097	ND
Benzene	1.56	mg/kg	0.0097	ND
Bromochloromethane	1.56	mg/kg	0.019	ND
Bromodichloromethane	1.56	mg/kg	0.019	ND
Bromoform	1.56	mg/kg	0.019	ND
Bromomethane	1.56	mg/kg	0.019	ND
Carbon disulfide	1.56	mg/kg	0.019	ND
Carbon tetrachloride	1.56	mg/kg	0.019	ND
Chlorobenzene	1.56	mg/kg	0.019	ND
Chloroethane	1.56	mg/kg	0.019	ND
Chloroform	1.56	mg/kg	0.019	ND
Chloromethane	1.56	mg/kg	0.019	ND
cis-1,2-Dichloroethene	1.56	mg/kg	0.019	ND
cis-1,3-Dichloropropene	1.56	mg/kg	0.019	ND
Cyclohexane	1.56	mg/kg	0.019	ND
Dibromochloromethane	1.56	mg/kg	0.019	ND
Dichlorodifluoromethane	1.56	mg/kg	0.019	ND
Ethylbenzene	1.56	mg/kg	0.0097	ND
Isopropylbenzene	1.56	mg/kg	0.0097	ND
m&p-Xylenes	1.56	mg/kg	0.0097	ND
Methyl Acetate	1.56	mg/kg	0.019	ND
Methylcyclohexane	1.56	mg/kg	0.019	ND
Methylene chloride	1.56	mg/kg	0.019	ND
Methyl-t-butyl ether	1.56	mg/kg	0.0097	ND
o-Xylene	1.56	mg/kg	0.0097	ND
Styrene	1.56	mg/kg	0.019	ND
Tetrachloroethene	1.56	mg/kg	0.019	ND
Toluene	1.56	mg/kg	0.0097	ND
trans-1,2-Dichloroethene	1.56	mg/kg	0.019	ND
trans-1,3-Dichloropropene	1.56	mg/kg	0.019	ND
Trichloroethene	1.56	mg/kg	0.019	ND
Trichlorofluoromethane	1.56	mg/kg	0.019	ND
Vinyl chloride	1.56	mg/kg	0.019	ND
Xylenes (Total)	1.56	mg/kg	0.0097	ND

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
Toluene-d8	24.89	30	68	122	83	
Dibromofluoromethane	36.67	30	63	140	122	
Bromofluorobenzene	32.48	30	64	129	108	
1,2-Dichloroethane-d4	35.80	30	63	143	119	

Volatile Organics + 15 (8260) Library Searches

Analyte	DF	Units	RT	Result
Methane, thiobis-	**1.56**	**mg/kg**	**2.78**	**0.077J**
TotalVolatileTic	**1.56**	**mg/kg**	**NA**	**0.077J**

Sample ID: WCSB02 | **Collection Date: 12/30/2016**
Lab#: AC95422-002 | **Receipt Date: 12/30/2016**
Matrix: Soil/Encore

% Solids SM2540G

Analyte	DF	Units	RL	Result
% Solids	**1**	**percent**		**16**

Cyanide (Soil/Waste) 9012B

Analyte	DF	Units	RL	Result
Cyanide	1	mg/kg	1.5	ND

Mercury (Soil/Waste) 7471B

Analyte	DF	Units	RL	Result
Mercury	**1**	**mg/kg**	**0.52**	**1.5**

Organochlorine Pesticides 8081

Analyte	DF	Units	RL	Result
a-Chlordane	**1**	**mg/kg**	**0.031**	**0.053**
Aldrin	1	mg/kg	0.031	ND
Alpha-BHC	1	mg/kg	0.0063	ND
beta-BHC	1	mg/kg	0.0063	ND
Chlordane (Total)	**1**	**mg/kg**	**0.031**	**0.053**
delta-BHC	1	mg/kg	0.031	ND
Dieldrin	1	mg/kg	0.0063	ND
Endosulfan I	1	mg/kg	0.031	ND
Endosulfan II	1	mg/kg	0.031	ND
Endosulfan Sulfate	1	mg/kg	0.031	ND
Endrin	1	mg/kg	0.031	ND
Endrin Aldehyde	1	mg/kg	0.031	ND
Endrin Ketone	1	mg/kg	0.031	ND
gamma-BHC	1	mg/kg	0.0063	ND
Heptachlor	1	mg/kg	0.031	ND
Heptachlor Epoxide	1	mg/kg	0.031	ND
Methoxychlor	1	mg/kg	0.031	ND
p,p'-DDD	1	mg/kg	0.016	ND
p,p'-DDE	1	mg/kg	0.016	ND
p,p'-DDT	1	mg/kg	0.016	ND
Toxaphene	1	mg/kg	0.16	ND
y-Chlordane	1	mg/kg	0.031	ND

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
TCMX-Surrogate	97.63	100	37	141	98	
TCMX-Surrogate	97.74	100	37	141	98	
DCB-Surrogate	99.02	100	33	146	99	
DCB-Surrogate	90.30	100	33	146	90	

pH 9040C/9045D

Analyte	DF	Units	RL	Result
pH	**1**	**ph**		**7**

Semivolatile Organics + 15 (8270)

Analyte	DF	Units	RL	Result
1,1'-Biphenyl	1	mg/kg	0.21	ND
1,2,4,5-Tetrachlorobenzene	1	mg/kg	0.21	ND
2,3,4,6-Tetrachlorophenol	1	mg/kg	0.21	ND
2,4,5-Trichlorophenol	1	mg/kg	0.21	ND
2,4,6-Trichlorophenol	1	mg/kg	0.21	ND
2,4-Dichlorophenol	1	mg/kg	0.052	ND
2,4-Dimethylphenol	1	mg/kg	0.052	ND
2,4-Dinitrophenol	1	mg/kg	1.0	ND
2,4-Dinitrotoluene	1	mg/kg	0.21	ND
2,6-Dinitrotoluene	1	mg/kg	0.21	ND
2-Chloronaphthalene	1	mg/kg	0.21	ND
2-Chlorophenol	1	mg/kg	0.21	ND
2-Methylnaphthalene	1	mg/kg	0.21	ND
2-Methylphenol	1	mg/kg	0.052	ND
2-Nitroaniline	1	mg/kg	0.21	ND
2-Nitrophenol	1	mg/kg	0.21	ND
3&4-Methylphenol	1	mg/kg	0.052	ND
3,3'-Dichlorobenzidine	1	mg/kg	0.21	ND

Sample ID: WCSB02 **Collection Date: 12/30/2016**
Lab#: AC95422-002 **Receipt Date: 12/30/2016**
Matrix: Soil/Encore

3-Nitroaniline	1	mg/kg	0.21	ND
4,6-Dinitro-2-methylphenol	1	mg/kg	1.0	ND
4-Bromophenyl-phenylether	1	mg/kg	0.21	ND
4-Chloro-3-methylphenol	1	mg/kg	0.21	ND
4-Chloroaniline	1	mg/kg	0.052	ND
4-Chlorophenyl-phenylether	1	mg/kg	0.21	ND
4-Nitroaniline	1	mg/kg	0.21	ND
4-Nitrophenol	1	mg/kg	0.21	ND
Acenaphthene	1	mg/kg	0.21	ND
Acenaphthylene	1	mg/kg	0.21	ND
Acetophenone	1	mg/kg	0.21	ND
Anthracene	1	mg/kg	0.21	ND
Atrazine	1	mg/kg	0.21	ND
Benzaldehyde	1	mg/kg	0.21	ND
Benzo[a]anthracene	1	mg/kg	0.21	ND
Benzo[a]pyrene	1	mg/kg	0.21	ND
Benzo[b]fluoranthene	1	mg/kg	0.21	ND
Benzo[g,h,i]perylene	1	mg/kg	0.21	ND
Benzo[k]fluoranthene	1	mg/kg	0.21	ND
bis(2-Chloroethoxy)methane	1	mg/kg	0.21	ND
bis(2-Chloroethyl)ether	1	mg/kg	0.052	ND
bis(2-Chloroisopropyl)ether	1	mg/kg	0.21	ND
bis(2-Ethylhexyl)phthalate	**1**	**mg/kg**	**0.21**	**0.40**
Butylbenzylphthalate	1	mg/kg	0.21	ND
Caprolactam	1	mg/kg	0.21	ND
Carbazole	1	mg/kg	0.21	ND
Chrysene	1	mg/kg	0.21	ND
Dibenzo[a,h]anthracene	1	mg/kg	0.21	ND
Dibenzofuran	1	mg/kg	0.052	ND
Diethylphthalate	1	mg/kg	0.21	ND
Dimethylphthalate	1	mg/kg	0.21	ND
Di-n-butylphthalate	1	mg/kg	0.052	ND
Di-n-octylphthalate	1	mg/kg	0.21	ND
Fluoranthene	1	mg/kg	0.21	ND
Fluorene	1	mg/kg	0.21	ND
Hexachlorobenzene	1	mg/kg	0.21	ND
Hexachlorobutadiene	1	mg/kg	0.21	ND
Hexachlorocyclopentadiene	1	mg/kg	0.49	ND
Hexachloroethane	1	mg/kg	0.21	ND
Indeno[1,2,3-cd]pyrene	1	mg/kg	0.21	ND
Isophorone	1	mg/kg	0.21	ND
Naphthalene	1	mg/kg	0.052	ND
Nitrobenzene	1	mg/kg	0.21	ND
N-Nitroso-di-n-propylamine	1	mg/kg	0.052	ND
N-Nitrosodiphenylamine	1	mg/kg	0.21	ND
Pentachlorophenol	1	mg/kg	1.0	ND
Phenanthrene	1	mg/kg	0.21	ND
Phenol	1	mg/kg	0.21	ND
Pyrene	1	mg/kg	0.21	ND

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
Terphenyl-d14	10.82	50	58	148	22	Sb8
Phenol-d5	29.20	100	49	129	29	Sa8
Nitrobenzene-d5	7.96	50	52	129	16	Sb8
2-Fluorophenol	27.16	100	43	128	27	Sa8
2-Fluorobiphenyl	8.01	50	58	125	16	Sb8
2,4,6-Tribromophenol	20.71	100	54	145	21	Sa8

Semivolatile Organics + 15 (8270) Library Searches

Analyte	DF	Units	RT	Result
(24R)-4-STIGMASTEN-3-ONE	**1**	**mg/kg**	**11.82**	**3.2J**
Tritetracontane	**1**	**mg/kg**	**12.73**	**0.72J**
Heptacosane	**1**	**mg/kg**	**13.49**	**1.7J**
Nonacosane	**1**	**mg/kg**	**14.21**	**1.2J**
Vitamin E	**1**	**mg/kg**	**15.24**	**0.99J**
Tetradecanal	**1**	**mg/kg**	**15.72**	**0.64J**
unknown	**1**	**mg/kg**	**15.92**	**1.1J**
1-Octadecene	**1**	**mg/kg**	**16.07**	**1.4J**
Stigmast-5-en-3-ol, (3.beta.,24S)-	**1**	**mg/kg**	**16.41**	**2.7J**
unknown	**1**	**mg/kg**	**16.5**	**0.90J**

unknown	**1**	**mg/kg**	**3.07**	**0.74J**
unknown	**1**	**mg/kg**	**4.07**	**5.8JB**
2-Pentanone, 4-hydroxy-4-methyl-	**1**	**mg/kg**	**4.4**	**150JAB**
unknown	**1**	**mg/kg**	**5.07**	**1.1JB**
TotalSemiVolatileTic	**1**	**mg/kg**	**NA**	**170J**

TAL Metals 6010

Analyte	DF	Units	RL	Result
Aluminum	**1**	**mg/kg**	**1200**	**33000**
Barium	1	mg/kg	62	ND
Calcium	1	mg/kg	6200	ND
Chromium	**1**	**mg/kg**	**31**	**140**
Cobalt	**1**	**mg/kg**	**16**	**30**
Copper	**1**	**mg/kg**	**31**	**160**
Iron	**1**	**mg/kg**	**1200**	**54000**
Lead	**1**	**mg/kg**	**31**	**240**
Magnesium	**1**	**mg/kg**	**3100**	**5700**
Manganese	**1**	**mg/kg**	**62**	**190**
Nickel	**1**	**mg/kg**	**31**	**61**
Potassium	1	mg/kg	3100	ND
Sodium	**1**	**mg/kg**	**1600**	**14000**
Vanadium	**1**	**mg/kg**	**62**	**110**
Zinc	**1**	**mg/kg**	**62**	**470**

TAL Metals 6020

Analyte	DF	Units	RL	Result
Antimony	1	mg/kg	5.0	ND
Arsenic	**1**	**mg/kg**	**1.2**	**63**
Beryllium	**1**	**mg/kg**	**1.2**	**5.8**
Cadmium	1	mg/kg	2.5	ND
Selenium	**1**	**mg/kg**	**13**	**15**
Silver	**1**	**mg/kg**	**1.2**	**1.7**
Thallium	1	mg/kg	2.5	ND

TOC (Region II/Kahn)

Analyte	DF	Units	RL	Result
Total Organic Carbon	**1**	**mg/kg**	**8100**	**270000**

Volatile Organics + 15 (8260)

Analyte	DF	Units	RL	Result
1,1,1-Trichloroethane	1.66	mg/kg	0.021	ND
1,1,2,2-Tetrachloroethane	1.66	mg/kg	0.021	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	1.66	mg/kg	0.021	ND
1,1,2-Trichloroethane	1.66	mg/kg	0.021	ND
1,1-Dichloroethane	1.66	mg/kg	0.021	ND
1,1-Dichloroethene	1.66	mg/kg	0.021	ND
1,2,3-Trichlorobenzene	1.66	mg/kg	0.021	ND
1,2,4-Trichlorobenzene	1.66	mg/kg	0.021	ND
1,2-Dibromo-3-chloropropane	1.66	mg/kg	0.021	ND
1,2-Dibromoethane	1.66	mg/kg	0.010	ND
1,2-Dichlorobenzene	1.66	mg/kg	0.021	ND
1,2-Dichloroethane	1.66	mg/kg	0.021	ND
1,2-Dichloropropane	1.66	mg/kg	0.021	ND
1,3-Dichlorobenzene	1.66	mg/kg	0.021	ND
1,4-Dichlorobenzene	1.66	mg/kg	0.021	ND
1,4-Dioxane	1.66	mg/kg	1.0	ND
2-Butanone	1.66	mg/kg	0.021	ND
2-Hexanone	1.66	mg/kg	0.021	ND
4-Methyl-2-pentanone	1.66	mg/kg	0.021	ND
Acetone	1.66	mg/kg	0.10	ND
Benzene	1.66	mg/kg	0.010	ND
Bromochloromethane	1.66	mg/kg	0.021	ND
Bromodichloromethane	1.66	mg/kg	0.021	ND
Bromoform	1.66	mg/kg	0.021	ND
Bromomethane	1.66	mg/kg	0.021	ND
Carbon disulfide	1.66	mg/kg	0.021	ND
Carbon tetrachloride	1.66	mg/kg	0.021	ND
Chlorobenzene	1.66	mg/kg	0.021	ND

Sample ID: WCSB02 | **Collection Date: 12/30/2016**
Lab#: AC95422-002 | **Receipt Date: 12/30/2016**
Matrix: Soil/Encore

Chloroethane	1.66	mg/kg	0.021	ND	
Chloroform	1.66	mg/kg	0.021	ND	
Chloromethane	1.66	mg/kg	0.021	ND	
cis-1,2-Dichloroethene	1.66	mg/kg	0.021	ND	
cis-1,3-Dichloropropene	1.66	mg/kg	0.021	ND	
Cyclohexane	1.66	mg/kg	0.021	ND	
Dibromochloromethane	1.66	mg/kg	0.021	ND	
Dichlorodifluoromethane	1.66	mg/kg	0.021	ND	
Ethylbenzene	1.66	mg/kg	0.010	ND	
Isopropylbenzene	1.66	mg/kg	0.010	ND	
m&p-Xylenes	1.66	mg/kg	0.010	ND	
Methyl Acetate	1.66	mg/kg	0.021	ND	
Methylcyclohexane	1.66	mg/kg	0.021	ND	
Methylene chloride	1.66	mg/kg	0.021	ND	
Methyl-t-butyl ether	1.66	mg/kg	0.010	ND	
o-Xylene	1.66	mg/kg	0.010	ND	
Styrene	1.66	mg/kg	0.021	ND	
Tetrachloroethene	1.66	mg/kg	0.021	ND	
Toluene	1.66	mg/kg	0.010	ND	
trans-1,2-Dichloroethene	1.66	mg/kg	0.021	ND	
trans-1,3-Dichloropropene	1.66	mg/kg	0.021	ND	
Trichloroethene	1.66	mg/kg	0.021	ND	
Trichlorofluoromethane	1.66	mg/kg	0.021	ND	
Vinyl chloride	1.66	mg/kg	0.021	ND	
Xylenes (Total)	1.66	mg/kg	0.010	ND	

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
Toluene-d8	24.32	30	68	122	81	
Dibromofluoromethane	39.46	30	63	140	132	
Bromofluorobenzene	33.24	30	64	129	111	
1,2-Dichloroethane-d4	36.46	30	63	143	122	

Volatile Organics + 15 (8260) Library Searches

Analyte	DF	Units	RT	Result
No Unknown Compounds Detected	1.66	mg/kg	NA	ND
TotalVolatileTic	1.66	mg/kg	NA	ND

Sample ID: WCSB03 | **Collection Date: 12/30/2016**
Lab#: AC95422-003 | **Receipt Date: 12/30/2016**
Matrix: Soil/Encore

% Solids SM2540G

Analyte	DF	Units	RL	Result
% Solids	1	percent		20

Cyanide (Soil/Waste) 9012B

Analyte	DF	Units	RL	Result
Cyanide	1	mg/kg	1.2	2.3

Mercury (Soil/Waste) 7471B

Analyte	DF	Units	RL	Result
Mercury	1	mg/kg	0.42	0.71

Organochlorine Pesticides 8081

Analyte	DF	Units	RL	Result
a-Chlordane	1	mg/kg	0.025	ND
Aldrin	1	mg/kg	0.025	ND
Alpha-BHC	1	mg/kg	0.0050	ND
beta-BHC	1	mg/kg	0.0050	ND
Chlordane (Total)	1	mg/kg	0.025	ND
delta-BHC	1	mg/kg	0.025	ND
Dieldrin	1	mg/kg	0.0050	ND
Endosulfan I	1	mg/kg	0.025	ND
Endosulfan II	1	mg/kg	0.025	ND
Endosulfan Sulfate	1	mg/kg	0.025	ND
Endrin	1	mg/kg	0.025	ND
Endrin Aldehyde	1	mg/kg	0.025	ND
Endrin Ketone	1	mg/kg	0.025	ND
gamma-BHC	1	mg/kg	0.0050	ND
Heptachlor	1	mg/kg	0.025	ND
Heptachlor Epoxide	1	mg/kg	0.025	ND
Methoxychlor	1	mg/kg	0.025	ND
p,p'-DDD	1	mg/kg	0.013	ND
p,p'-DDE	1	mg/kg	0.013	ND
p,p'-DDT	1	mg/kg	0.013	ND
Toxaphene	1	mg/kg	0.13	ND
y-Chlordane	1	mg/kg	0.025	ND

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
TCMX-Surrogate	105.03	100	37	141	105	
TCMX-Surrogate	103.76	100	37	141	104	
DCB-Surrogate	102.35	100	33	146	102	
DCB-Surrogate	93.91	100	33	146	94	

pH 9040C/9045D

Analyte	DF	Units	RL	Result
pH	1	ph		7.2

Semivolatile Organics + 15 (8270)

Analyte	DF	Units	RL	Result
1,1'-Biphenyl	1	mg/kg	0.17	ND
1,2,4,5-Tetrachlorobenzene	1	mg/kg	0.17	ND
2,3,4,6-Tetrachlorophenol	1	mg/kg	0.17	ND
2,4,5-Trichlorophenol	1	mg/kg	0.17	ND
2,4,6-Trichlorophenol	1	mg/kg	0.17	ND
2,4-Dichlorophenol	1	mg/kg	0.042	ND
2,4-Dimethylphenol	1	mg/kg	0.042	ND
2,4-Dinitrophenol	1	mg/kg	0.83	ND
2,4-Dinitrotoluene	1	mg/kg	0.17	ND
2,6-Dinitrotoluene	1	mg/kg	0.17	ND
2-Chloronaphthalene	1	mg/kg	0.17	ND
2-Chlorophenol	1	mg/kg	0.17	ND
2-Methylnaphthalene	1	mg/kg	0.17	ND
2-Methylphenol	1	mg/kg	0.042	ND
2-Nitroaniline	1	mg/kg	0.17	ND
2-Nitrophenol	1	mg/kg	0.17	ND
3&4-Methylphenol	1	mg/kg	0.042	ND
3,3'-Dichlorobenzidine	1	mg/kg	0.17	ND

3-Nitroaniline	1	mg/kg	0.17	ND
4,6-Dinitro-2-methylphenol	1	mg/kg	0.83	ND
4-Bromophenyl-phenylether	1	mg/kg	0.17	ND
4-Chloro-3-methylphenol	1	mg/kg	0.17	ND
4-Chloroaniline	1	mg/kg	0.042	ND
4-Chlorophenyl-phenylether	1	mg/kg	0.17	ND
4-Nitroaniline	1	mg/kg	0.17	ND
4-Nitrophenol	1	mg/kg	0.17	ND
Acenaphthene	1	mg/kg	0.17	ND
Acenaphthylene	1	mg/kg	0.17	ND
Acetophenone	1	mg/kg	0.17	ND
Anthracene	1	mg/kg	0.17	ND
Atrazine	1	mg/kg	0.17	ND
Benzaldehyde	1	mg/kg	0.17	ND
Benzo[a]anthracene	1	mg/kg	0.17	ND
Benzo[a]pyrene	1	mg/kg	0.17	ND
Benzo[b]fluoranthene	**1**	**mg/kg**	**0.17**	**0.19**
Benzo[g,h,i]perylene	1	mg/kg	0.17	ND
Benzo[k]fluoranthene	1	mg/kg	0.17	ND
bis(2-Chloroethoxy)methane	1	mg/kg	0.17	ND
bis(2-Chloroethyl)ether	1	mg/kg	0.042	ND
bis(2-Chloroisopropyl)ether	1	mg/kg	0.17	ND
bis(2-Ethylhexyl)phthalate	**1**	**mg/kg**	**0.17**	**0.20**
Butylbenzylphthalate	1	mg/kg	0.17	ND
Caprolactam	1	mg/kg	0.17	ND
Carbazole	1	mg/kg	0.17	ND
Chrysene	1	mg/kg	0.17	ND
Dibenzo[a,h]anthracene	1	mg/kg	0.17	ND
Dibenzofuran	1	mg/kg	0.042	ND
Diethylphthalate	1	mg/kg	0.17	ND
Dimethylphthalate	1	mg/kg	0.17	ND
Di-n-butylphthalate	1	mg/kg	0.042	ND
Di-n-octylphthalate	1	mg/kg	0.17	ND
Fluoranthene	1	mg/kg	0.17	ND
Fluorene	1	mg/kg	0.17	ND
Hexachlorobenzene	1	mg/kg	0.17	ND
Hexachlorobutadiene	1	mg/kg	0.17	ND
Hexachlorocyclopentadiene	1	mg/kg	0.39	ND
Hexachloroethane	1	mg/kg	0.17	ND
Indeno[1,2,3-cd]pyrene	1	mg/kg	0.17	ND
Isophorone	1	mg/kg	0.17	ND
Naphthalene	1	mg/kg	0.042	ND
Nitrobenzene	1	mg/kg	0.17	ND
N-Nitroso-di-n-propylamine	1	mg/kg	0.042	ND
N-Nitrosodiphenylamine	1	mg/kg	0.17	ND
Pentachlorophenol	1	mg/kg	0.83	ND
Phenanthrene	1	mg/kg	0.17	ND
Phenol	1	mg/kg	0.17	ND
Pyrene	1	mg/kg	0.17	ND

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
Terphenyl-d14	25.51	50	58	148	51	Sb8
Phenol-d5	55.20	100	49	129	55	
Nitrobenzene-d5	26.55	50	52	129	53	
2-Fluorophenol	55.67	100	43	128	56	
2-Fluorobiphenyl	26.36	50	58	125	53	Sb8
2,4,6-Tribromophenol	57.27	100	54	145	57	

Semivolatile Organics + 15 (8270) Library Searches

Analyte	DF	Units	RT	Result
Tritetracontane	**1**	**mg/kg**	**12.7**	**1.3J**
Octadecanal	**1**	**mg/kg**	**13.24**	**1.3J**
Heptadecane	**1**	**mg/kg**	**13.46**	**2.2J**
Cycloheptadecanol	**1**	**mg/kg**	**13.98**	**1.7J**
Eicosane	**1**	**mg/kg**	**14.18**	**2.0J**
Hexatriacontane	**1**	**mg/kg**	**14.97**	**1.9J**
Vitamin E	**1**	**mg/kg**	**15.21**	**1.5J**
(Z)14-TRICOSENYL FORMATE	**1**	**mg/kg**	**15.68**	**1.7J**
Ergost-5-en-3-ol, (3.beta.)-	**1**	**mg/kg**	**15.88**	**1.8J**
1-Octadecene	**1**	**mg/kg**	**16.04**	**2.9J**

Stigmast-5-en-3-ol, (3.beta.,24S)-	**1**	**mg/kg**	**16.37**	**3.8J**
unknown	**1**	**mg/kg**	**16.42**	**3.1J**
Junipene	**1**	**mg/kg**	**16.65**	**2.3J**
2-Pentanone, 4-hydroxy-4-methyl-	**1**	**mg/kg**	**4.34**	**42JAB**
Ethane, 1,1,2,2-tetrachloro-	**1**	**mg/kg**	**5.12**	**1.3J**
TotalSemiVolatileTic	**1**	**mg/kg**	**NA**	**71J**

TAL Metals 6010

Analyte	DF	Units	RL	Result
Aluminum	**1**	**mg/kg**	**1000**	**73000**
Barium	**1**	**mg/kg**	**50**	**78**
Calcium	**1**	**mg/kg**	**5000**	**8000**
Chromium	**1**	**mg/kg**	**25**	**330**
Cobalt	**1**	**mg/kg**	**12**	**200**
Copper	**1**	**mg/kg**	**25**	**210**
Iron	**1**	**mg/kg**	**1000**	**110000**
Lead	**1**	**mg/kg**	**25**	**230**
Magnesium	**1**	**mg/kg**	**2500**	**11000**
Manganese	**1**	**mg/kg**	**50**	**11000**
Nickel	**1**	**mg/kg**	**25**	**240**
Potassium	**1**	**mg/kg**	**2500**	**4700**
Sodium	**1**	**mg/kg**	**1200**	**27000**
Vanadium	**1**	**mg/kg**	**50**	**140**
Zinc	**1**	**mg/kg**	**50**	**1300**

TAL Metals 6020

Analyte	DF	Units	RL	Result
Antimony	1	mg/kg	4.0	ND
Arsenic	**1**	**mg/kg**	**1.0**	**50**
Beryllium	**1**	**mg/kg**	**1.0**	**6.7**
Cadmium	1	mg/kg	2.0	ND
Selenium	**1**	**mg/kg**	**10**	**16**
Silver	1	mg/kg	1.0	ND
Thallium	1	mg/kg	2.0	ND

TOC (Region II/Kahn)

Analyte	DF	Units	RL	Result
Total Organic Carbon	**1**	**mg/kg**	**6500**	**170000**

Volatile Organics + 15 (8260)

Analyte	DF	Units	RL	Result
1,1,1-Trichloroethane	1.48	mg/kg	0.015	ND
1,1,2,2-Tetrachloroethane	1.48	mg/kg	0.015	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	1.48	mg/kg	0.015	ND
1,1,2-Trichloroethane	1.48	mg/kg	0.015	ND
1,1-Dichloroethane	1.48	mg/kg	0.015	ND
1,1-Dichloroethene	1.48	mg/kg	0.015	ND
1,2,3-Trichlorobenzene	1.48	mg/kg	0.015	ND
1,2,4-Trichlorobenzene	1.48	mg/kg	0.015	ND
1,2-Dibromo-3-chloropropane	1.48	mg/kg	0.015	ND
1,2-Dibromoethane	1.48	mg/kg	0.0074	ND
1,2-Dichlorobenzene	1.48	mg/kg	0.015	ND
1,2-Dichloroethane	1.48	mg/kg	0.015	ND
1,2-Dichloropropane	1.48	mg/kg	0.015	ND
1,3-Dichlorobenzene	1.48	mg/kg	0.015	ND
1,4-Dichlorobenzene	1.48	mg/kg	0.015	ND
1,4-Dioxane	1.48	mg/kg	0.74	ND
2-Butanone	1.48	mg/kg	0.015	ND
2-Hexanone	1.48	mg/kg	0.015	ND
4-Methyl-2-pentanone	1.48	mg/kg	0.015	ND
Acetone	1.48	mg/kg	0.074	ND
Benzene	1.48	mg/kg	0.0074	ND
Bromochloromethane	1.48	mg/kg	0.015	ND
Bromodichloromethane	1.48	mg/kg	0.015	ND
Bromoform	1.48	mg/kg	0.015	ND
Bromomethane	1.48	mg/kg	0.015	ND
Carbon disulfide	1.48	mg/kg	0.015	ND
Carbon tetrachloride	1.48	mg/kg	0.015	ND

Sample ID: WCSB03 | **Collection Date: 12/30/2016**
Lab#: AC95422-003 | **Receipt Date: 12/30/2016**
Matrix: Soil/Encore

Chlorobenzene	1.48	mg/kg	0.015	ND	
Chloroethane	1.48	mg/kg	0.015	ND	
Chloroform	1.48	mg/kg	0.015	ND	
Chloromethane	1.48	mg/kg	0.015	ND	
cis-1,2-Dichloroethene	1.48	mg/kg	0.015	ND	
cis-1,3-Dichloropropene	1.48	mg/kg	0.015	ND	
Cyclohexane	1.48	mg/kg	0.015	ND	
Dibromochloromethane	1.48	mg/kg	0.015	ND	
Dichlorodifluoromethane	1.48	mg/kg	0.015	ND	
Ethylbenzene	1.48	mg/kg	0.0074	ND	
Isopropylbenzene	1.48	mg/kg	0.0074	ND	
m&p-Xylenes	1.48	mg/kg	0.0074	ND	
Methyl Acetate	1.48	mg/kg	0.015	ND	
Methylcyclohexane	1.48	mg/kg	0.015	ND	
Methylene chloride	1.48	mg/kg	0.015	ND	
Methyl-t-butyl ether	1.48	mg/kg	0.0074	ND	
o-Xylene	1.48	mg/kg	0.0074	ND	
Styrene	1.48	mg/kg	0.015	ND	
Tetrachloroethene	1.48	mg/kg	0.015	ND	
Toluene	1.48	mg/kg	0.0074	ND	
trans-1,2-Dichloroethene	1.48	mg/kg	0.015	ND	
trans-1,3-Dichloropropene	1.48	mg/kg	0.015	ND	
Trichloroethene	1.48	mg/kg	0.015	ND	
Trichlorofluoromethane	1.48	mg/kg	0.015	ND	
Vinyl chloride	1.48	mg/kg	0.015	ND	
Xylenes (Total)	1.48	mg/kg	0.0074	ND	

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
Toluene-d8	25.12	30	68	122	84	
Dibromofluoromethane	39.22	30	63	140	131	
Bromofluorobenzene	29.87	30	64	129	100	
1,2-Dichloroethane-d4	29.75	30	63	143	99	

Volatile Organics + 15 (8260) Library Searches

Analyte	DF	Units	RT	Result
Methane, thiobis-	**1.48**	**mg/kg**	**2.78**	**0.056J**
TotalVolatileTic	**1.48**	**mg/kg**	**NA**	**0.056J**

Sample ID: WCSB04 | **Collection Date: 12/30/2016**
Lab#: AC95422-004 | **Receipt Date: 12/30/2016**
Matrix: Soil/Encore

% Solids SM2540G

Analyte	DF	Units	RL	Result
% Solids	**1**	**percent**		**15**

Cyanide (Soil/Waste) 9012B

Analyte	DF	Units	RL	Result
Cyanide	1	mg/kg	1.6	ND

Mercury (Soil/Waste) 7471B

Analyte	DF	Units	RL	Result
Mercury	1	mg/kg	0.56	ND

Organochlorine Pesticides 8081

Analyte	DF	Units	RL	Result
a-Chlordane	1	mg/kg	0.033	ND
Aldrin	1	mg/kg	0.033	ND
Alpha-BHC	1	mg/kg	0.0067	ND
beta-BHC	1	mg/kg	0.0067	ND
Chlordane (Total)	1	mg/kg	0.033	ND
delta-BHC	1	mg/kg	0.033	ND
Dieldrin	1	mg/kg	0.0067	ND
Endosulfan I	1	mg/kg	0.033	ND
Endosulfan II	1	mg/kg	0.033	ND
Endosulfan Sulfate	1	mg/kg	0.033	ND
Endrin	1	mg/kg	0.033	ND
Endrin Aldehyde	1	mg/kg	0.033	ND
Endrin Ketone	1	mg/kg	0.033	ND
gamma-BHC	1	mg/kg	0.0067	ND
Heptachlor	1	mg/kg	0.033	ND
Heptachlor Epoxide	1	mg/kg	0.033	ND
Methoxychlor	1	mg/kg	0.033	ND
p,p'-DDD	1	mg/kg	0.017	ND
p,p'-DDE	**1**	**mg/kg**	**0.017**	**0.043**
p,p'-DDT	1	mg/kg	0.017	ND
Toxaphene	1	mg/kg	0.17	ND
y-Chlordane	1	mg/kg	0.033	ND

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
TCMX-Surrogate	97.94	100	37	141	98	
TCMX-Surrogate	98.05	100	37	141	98	
DCB-Surrogate	94.42	100	33	146	94	
DCB-Surrogate	86.49	100	33	146	86	

pH 9040C/9045D

Analyte	DF	Units	RL	Result
pH	**1**	**ph**		**6.8**

Semivolatile Organics + 15 (8270)

Analyte	DF	Units	RL	Result
1,1'-Biphenyl	1	mg/kg	0.22	ND
1,2,4,5-Tetrachlorobenzene	1	mg/kg	0.22	ND
2,3,4,6-Tetrachlorophenol	1	mg/kg	0.22	ND
2,4,5-Trichlorophenol	1	mg/kg	0.22	ND
2,4,6-Trichlorophenol	1	mg/kg	0.22	ND
2,4-Dichlorophenol	1	mg/kg	0.056	ND
2,4-Dimethylphenol	1	mg/kg	0.056	ND
2,4-Dinitrophenol	1	mg/kg	1.1	ND
2,4-Dinitrotoluene	1	mg/kg	0.22	ND
2,6-Dinitrotoluene	1	mg/kg	0.22	ND
2-Chloronaphthalene	1	mg/kg	0.22	ND
2-Chlorophenol	1	mg/kg	0.22	ND
2-Methylnaphthalene	1	mg/kg	0.22	ND
2-Methylphenol	1	mg/kg	0.056	ND
2-Nitroaniline	1	mg/kg	0.22	ND
2-Nitrophenol	1	mg/kg	0.22	ND
3&4-Methylphenol	1	mg/kg	0.056	ND
3,3'-Dichlorobenzidine	1	mg/kg	0.22	ND

3-Nitroaniline	1	mg/kg	0.22	ND
4,6-Dinitro-2-methylphenol	1	mg/kg	1.1	ND
4-Bromophenyl-phenylether	1	mg/kg	0.22	ND
4-Chloro-3-methylphenol	1	mg/kg	0.22	ND
4-Chloroaniline	1	mg/kg	0.056	ND
4-Chlorophenyl-phenylether	1	mg/kg	0.22	ND
4-Nitroaniline	1	mg/kg	0.22	ND
4-Nitrophenol	1	mg/kg	0.22	ND
Acenaphthene	1	mg/kg	0.22	ND
Acenaphthylene	1	mg/kg	0.22	ND
Acetophenone	1	mg/kg	0.22	ND
Anthracene	1	mg/kg	0.22	ND
Atrazine	1	mg/kg	0.22	ND
Benzaldehyde	1	mg/kg	0.22	ND
Benzo[a]anthracene	1	mg/kg	0.22	ND
Benzo[a]pyrene	1	mg/kg	0.22	ND
Benzo[b]fluoranthene	1	mg/kg	0.22	ND
Benzo[g,h,i]perylene	1	mg/kg	0.22	ND
Benzo[k]fluoranthene	1	mg/kg	0.22	ND
bis(2-Chloroethoxy)methane	1	mg/kg	0.22	ND
bis(2-Chloroethyl)ether	1	mg/kg	0.056	ND
bis(2-Chloroisopropyl)ether	1	mg/kg	0.22	ND
bis(2-Ethylhexyl)phthalate	**1**	**mg/kg**	**0.22**	**0.35**
Butylbenzylphthalate	1	mg/kg	0.22	ND
Caprolactam	1	mg/kg	0.22	ND
Carbazole	1	mg/kg	0.22	ND
Chrysene	1	mg/kg	0.22	ND
Dibenzo[a,h]anthracene	1	mg/kg	0.22	ND
Dibenzofuran	1	mg/kg	0.056	ND
Diethylphthalate	1	mg/kg	0.22	ND
Dimethylphthalate	1	mg/kg	0.22	ND
Di-n-butylphthalate	1	mg/kg	0.056	ND
Di-n-octylphthalate	1	mg/kg	0.22	ND
Fluoranthene	1	mg/kg	0.22	ND
Fluorene	1	mg/kg	0.22	ND
Hexachlorobenzene	1	mg/kg	0.22	ND
Hexachlorobutadiene	1	mg/kg	0.22	ND
Hexachlorocyclopentadiene	1	mg/kg	0.52	ND
Hexachloroethane	1	mg/kg	0.22	ND
Indeno[1,2,3-cd]pyrene	1	mg/kg	0.22	ND
Isophorone	1	mg/kg	0.22	ND
Naphthalene	1	mg/kg	0.056	ND
Nitrobenzene	1	mg/kg	0.22	ND
N-Nitroso-di-n-propylamine	1	mg/kg	0.056	ND
N-Nitrosodiphenylamine	1	mg/kg	0.22	ND
Pentachlorophenol	1	mg/kg	1.1	ND
Phenanthrene	1	mg/kg	0.22	ND
Phenol	1	mg/kg	0.22	ND
Pyrene	1	mg/kg	0.22	ND

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
Terphenyl-d14	30.89	50	58	148	62	
Phenol-d5	73.33	100	49	129	73	
Nitrobenzene-d5	33.36	50	52	129	67	
2-Fluorophenol	74.97	100	43	128	75	
2-Fluorobiphenyl	32.62	50	58	125	65	
2,4,6-Tribromophenol	70.05	100	54	145	70	

Semivolatile Organics + 15 (8270) Library Searches

Analyte	DF	Units	RT	Result
8-(1,1,2-Trimethyl-2-propenyl)-8H-cyclo	**1**	**mg/kg**	**13.01**	**2.9J**
Heptadecane	**1**	**mg/kg**	**13.46**	**3.0J**
Hexatriacontane	**1**	**mg/kg**	**14.18**	**3.3J**
Nonadecane, 9-methyl-	**1**	**mg/kg**	**14.97**	**1.9J**
Vitamin E	**1**	**mg/kg**	**15.21**	**1.8J**
Hexadecanal	**1**	**mg/kg**	**15.68**	**1.9J**
Ergost-5-en-3-ol, (3.beta.)-	**1**	**mg/kg**	**15.89**	**2.1J**
1-Octadecene	**1**	**mg/kg**	**16.04**	**3.7J**
Stigmast-5-en-3-ol, (3.beta.,24S)-	**1**	**mg/kg**	**16.37**	**5.8J**
unknown	**1**	**mg/kg**	**16.47**	**1.4J**

5.ALPHA.-STIGMAST-3-ONE	**1**	**mg/kg**	**16.69**	**1.6J**
unknown	**1**	**mg/kg**	**4.05**	**2.8JY**
2-Pentanone, 4-hydroxy-4-methyl-	**1**	**mg/kg**	**4.35**	**93JAY**
Ethane, 1,1,2,2-tetrachloro-	**1**	**mg/kg**	**5.12**	**1.4J**
unknown	**1**	**mg/kg**	**7.39**	**1.9J**
TotalSemiVolatileTic	**1**	**mg/kg**	**NA**	**130J**

TAL Metals 6010

Analyte	DF	Units	RL	Result
Aluminum	**1**	**mg/kg**	**1300**	**31000**
Barium	1	mg/kg	67	ND
Calcium	**1**	**mg/kg**	**6700**	**7700**
Chromium	**1**	**mg/kg**	**33**	**83**
Cobalt	**1**	**mg/kg**	**17**	**50**
Copper	**1**	**mg/kg**	**33**	**140**
Iron	**1**	**mg/kg**	**1300**	**49000**
Lead	**1**	**mg/kg**	**33**	**110**
Magnesium	**1**	**mg/kg**	**3300**	**8000**
Manganese	**1**	**mg/kg**	**67**	**180**
Nickel	**1**	**mg/kg**	**33**	**100**
Potassium	**1**	**mg/kg**	**3300**	**3400**
Sodium	**1**	**mg/kg**	**1700**	**24000**
Vanadium	1	mg/kg	67	ND
Zinc	**1**	**mg/kg**	**67**	**550**

TAL Metals 6020

Analyte	DF	Units	RL	Result
Antimony	1	mg/kg	5.3	ND
Arsenic	**1**	**mg/kg**	**1.3**	**34**
Beryllium	**1**	**mg/kg**	**1.3**	**5.8**
Cadmium	1	mg/kg	2.7	ND
Selenium	**1**	**mg/kg**	**13**	**17**
Silver	1	mg/kg	1.3	ND
Thallium	1	mg/kg	2.7	ND

TOC (Region II/Kahn)

Analyte	DF	Units	RL	Result
Total Organic Carbon	**1**	**mg/kg**	**8700**	**290000**

Volatile Organics + 15 (8260)

Analyte	DF	Units	RL	Result
1,1,1-Trichloroethane	1.58	mg/kg	0.021	ND
1,1,2,2-Tetrachloroethane	1.58	mg/kg	0.021	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	1.58	mg/kg	0.021	ND
1,1,2-Trichloroethane	1.58	mg/kg	0.021	ND
1,1-Dichloroethane	1.58	mg/kg	0.021	ND
1,1-Dichloroethene	1.58	mg/kg	0.021	ND
1,2,3-Trichlorobenzene	1.58	mg/kg	0.021	ND
1,2,4-Trichlorobenzene	1.58	mg/kg	0.021	ND
1,2-Dibromo-3-chloropropane	1.58	mg/kg	0.021	ND
1,2-Dibromoethane	1.58	mg/kg	0.011	ND
1,2-Dichlorobenzene	1.58	mg/kg	0.021	ND
1,2-Dichloroethane	1.58	mg/kg	0.021	ND
1,2-Dichloropropane	1.58	mg/kg	0.021	ND
1,3-Dichlorobenzene	1.58	mg/kg	0.021	ND
1,4-Dichlorobenzene	1.58	mg/kg	0.021	ND
1,4-Dioxane	1.58	mg/kg	1.1	ND
2-Butanone	1.58	mg/kg	0.021	ND
2-Hexanone	1.58	mg/kg	0.021	ND
4-Methyl-2-pentanone	1.58	mg/kg	0.021	ND
Acetone	1.58	mg/kg	0.11	ND
Benzene	1.58	mg/kg	0.011	ND
Bromochloromethane	1.58	mg/kg	0.021	ND
Bromodichloromethane	1.58	mg/kg	0.021	ND
Bromoform	1.58	mg/kg	0.021	ND
Bromomethane	1.58	mg/kg	0.021	ND
Carbon disulfide	1.58	mg/kg	0.021	ND
Carbon tetrachloride	1.58	mg/kg	0.021	ND

Sample ID: WCSB04 | **Collection Date: 12/30/2016**
Lab#: AC95422-004 | **Receipt Date: 12/30/2016**
Matrix: Soil/Encore

Chlorobenzene	1.58	mg/kg	0.021	ND	
Chloroethane	1.58	mg/kg	0.021	ND	
Chloroform	1.58	mg/kg	0.021	ND	
Chloromethane	1.58	mg/kg	0.021	ND	
cis-1,2-Dichloroethene	1.58	mg/kg	0.021	ND	
cis-1,3-Dichloropropene	1.58	mg/kg	0.021	ND	
Cyclohexane	1.58	mg/kg	0.021	ND	
Dibromochloromethane	1.58	mg/kg	0.021	ND	
Dichlorodifluoromethane	1.58	mg/kg	0.021	ND	
Ethylbenzene	1.58	mg/kg	0.011	ND	
Isopropylbenzene	1.58	mg/kg	0.011	ND	
m&p-Xylenes	1.58	mg/kg	0.011	ND	
Methyl Acetate	1.58	mg/kg	0.021	ND	
Methylcyclohexane	1.58	mg/kg	0.021	ND	
Methylene chloride	1.58	mg/kg	0.021	ND	
Methyl-t-butyl ether	1.58	mg/kg	0.011	ND	
o-Xylene	1.58	mg/kg	0.011	ND	
Styrene	1.58	mg/kg	0.021	ND	
Tetrachloroethene	1.58	mg/kg	0.021	ND	
Toluene	1.58	mg/kg	0.011	ND	
trans-1,2-Dichloroethene	1.58	mg/kg	0.021	ND	
trans-1,3-Dichloropropene	1.58	mg/kg	0.021	ND	
Trichloroethene	1.58	mg/kg	0.021	ND	
Trichlorofluoromethane	1.58	mg/kg	0.021	ND	
Vinyl chloride	1.58	mg/kg	0.021	ND	
Xylenes (Total)	1.58	mg/kg	0.011	ND	

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
Toluene-d8	26.52	30	68	122	88	
Dibromofluoromethane	33.43	30	63	140	111	
Bromofluorobenzene	31.30	30	64	129	104	
1,2-Dichloroethane-d4	27.99	30	63	143	93	

Volatile Organics + 15 (8260) Library Searches

Analyte	DF	Units	RT	Result
No Unknown Compounds Detected	1.58	mg/kg	NA	ND
TotalVolatileTic	1.58	mg/kg	NA	ND

Sample ID: WCSB05 | **Collection Date: 12/30/2016**
Lab#: AC95422-005 | **Receipt Date: 12/30/2016**
Matrix: Soil/Encore

% Solids SM2540G

Analyte	DF	Units	RL	Result
% Solids	**1**	**percent**		**32**

Cyanide (Soil/Waste) 9012B

Analyte	DF	Units	RL	Result
Cyanide	1	mg/kg	0.75	ND

Mercury (Soil/Waste) 7471B

Analyte	DF	Units	RL	Result
Mercury	**1**	**mg/kg**	**0.26**	**1.0**

Organochlorine Pesticides 8081

Analyte	DF	Units	RL	Result
a-Chlordane	10	mg/kg	0.16	ND
Aldrin	10	mg/kg	0.16	ND
Alpha-BHC	10	mg/kg	0.031	ND
beta-BHC	10	mg/kg	0.031	ND
Chlordane (Total)	10	mg/kg	0.16	ND
delta-BHC	10	mg/kg	0.16	ND
Dieldrin	10	mg/kg	0.031	ND
Endosulfan I	10	mg/kg	0.16	ND
Endosulfan II	10	mg/kg	0.16	ND
Endosulfan Sulfate	10	mg/kg	0.16	ND
Endrin	10	mg/kg	0.16	ND
Endrin Aldehyde	10	mg/kg	0.16	ND
Endrin Ketone	10	mg/kg	0.16	ND
gamma-BHC	10	mg/kg	0.031	ND
Heptachlor	10	mg/kg	0.16	ND
Heptachlor Epoxide	10	mg/kg	0.16	ND
Methoxychlor	10	mg/kg	0.16	ND
p,p'-DDD	**10**	**mg/kg**	**0.078**	**0.14**
p,p'-DDE	**10**	**mg/kg**	**0.078**	**0.092**
p,p'-DDT	**10**	**mg/kg**	**0.078**	**0.17**
Toxaphene	10	mg/kg	0.78	ND
y-Chlordane	10	mg/kg	0.16	ND

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
TCMX-Surrogate	9.57	100	37	141	96	
TCMX-Surrogate	9.35	100	37	141	94	
DCB-Surrogate	14.46	100	33	146	145	
DCB-Surrogate	11.88	100	33	146	119	

pH 9040C/9045D

Analyte	DF	Units	RL	Result
pH	**1**	**ph**		**6.8**

Semivolatile Organics + 15 (8270)

Analyte	DF	Units	RL	Result
1,1'-Biphenyl	1	mg/kg	0.10	ND
1,2,4,5-Tetrachlorobenzene	1	mg/kg	0.10	ND
2,3,4,6-Tetrachlorophenol	1	mg/kg	0.10	ND
2,4,5-Trichlorophenol	1	mg/kg	0.10	ND
2,4,6-Trichlorophenol	1	mg/kg	0.10	ND
2,4-Dichlorophenol	1	mg/kg	0.026	ND
2,4-Dimethylphenol	1	mg/kg	0.026	ND
2,4-Dinitrophenol	1	mg/kg	0.52	ND
2,4-Dinitrotoluene	1	mg/kg	0.10	ND
2,6-Dinitrotoluene	1	mg/kg	0.10	ND
2-Chloronaphthalene	1	mg/kg	0.10	ND
2-Chlorophenol	1	mg/kg	0.10	ND
2-Methylnaphthalene	1	mg/kg	0.10	ND
2-Methylphenol	1	mg/kg	0.026	ND
2-Nitroaniline	1	mg/kg	0.10	ND
2-Nitrophenol	1	mg/kg	0.10	ND
3&4-Methylphenol	1	mg/kg	0.026	ND
3,3'-Dichlorobenzidine	1	mg/kg	0.10	ND

3-Nitroaniline	1	mg/kg	0.10	ND
4,6-Dinitro-2-methylphenol	1	mg/kg	0.52	ND
4-Bromophenyl-phenylether	1	mg/kg	0.10	ND
4-Chloro-3-methylphenol	1	mg/kg	0.10	ND
4-Chloroaniline	1	mg/kg	0.026	ND
4-Chlorophenyl-phenylether	1	mg/kg	0.10	ND
4-Nitroaniline	1	mg/kg	0.10	ND
4-Nitrophenol	1	mg/kg	0.10	ND
Acenaphthene	1	mg/kg	0.10	ND
Acenaphthylene	1	mg/kg	0.10	ND
Acetophenone	1	mg/kg	0.10	ND
Anthracene	1	mg/kg	0.10	ND
Atrazine	1	mg/kg	0.10	ND
Benzaldehyde	1	mg/kg	0.10	ND
Benzo[a]anthracene	**1**	**mg/kg**	**0.10**	**0.17**
Benzo[a]pyrene	**1**	**mg/kg**	**0.10**	**0.17**
Benzo[b]fluoranthene	**1**	**mg/kg**	**0.10**	**0.28**
Benzo[g,h,i]perylene	**1**	**mg/kg**	**0.10**	**0.19**
Benzo[k]fluoranthene	1	mg/kg	0.10	ND
bis(2-Chloroethoxy)methane	1	mg/kg	0.10	ND
bis(2-Chloroethyl)ether	1	mg/kg	0.026	ND
bis(2-Chloroisopropyl)ether	1	mg/kg	0.10	ND
bis(2-Ethylhexyl)phthalate	**1**	**mg/kg**	**0.10**	**0.57**
Butylbenzylphthalate	1	mg/kg	0.10	ND
Caprolactam	1	mg/kg	0.10	ND
Carbazole	1	mg/kg	0.10	ND
Chrysene	**1**	**mg/kg**	**0.10**	**0.21**
Dibenzo[a,h]anthracene	1	mg/kg	0.10	ND
Dibenzofuran	1	mg/kg	0.026	ND
Diethylphthalate	1	mg/kg	0.10	ND
Dimethylphthalate	1	mg/kg	0.10	ND
Di-n-butylphthalate	1	mg/kg	0.026	ND
Di-n-octylphthalate	1	mg/kg	0.10	ND
Fluoranthene	**1**	**mg/kg**	**0.10**	**0.33**
Fluorene	1	mg/kg	0.10	ND
Hexachlorobenzene	1	mg/kg	0.10	ND
Hexachlorobutadiene	1	mg/kg	0.10	ND
Hexachlorocyclopentadiene	1	mg/kg	0.25	ND
Hexachloroethane	1	mg/kg	0.10	ND
Indeno[1,2,3-cd]pyrene	**1**	**mg/kg**	**0.10**	**0.12**
Isophorone	1	mg/kg	0.10	ND
Naphthalene	1	mg/kg	0.026	ND
Nitrobenzene	1	mg/kg	0.10	ND
N-Nitroso-di-n-propylamine	1	mg/kg	0.026	ND
N-Nitrosodiphenylamine	1	mg/kg	0.10	ND
Pentachlorophenol	1	mg/kg	0.52	ND
Phenanthrene	**1**	**mg/kg**	**0.10**	**0.17**
Phenol	1	mg/kg	0.10	ND
Pyrene	**1**	**mg/kg**	**0.10**	**0.30**

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
Terphenyl-d14	6.39	50	58	148	13	Sb8
Phenol-d5	12.42	100	49	129	12	Sa8
Nitrobenzene-d5	6.29	50	52	129	13	Sb8
2-Fluorophenol	12.77	100	43	128	13	Sa8
2-Fluorobiphenyl	6.51	50	58	125	13	Sb8
2,4,6-Tribromophenol	13.47	100	54	145	13	Sa8

Semivolatile Organics + 15 (8270) Library Searches

Analyte	DF	Units	RT	Result
unknown	**1**	**mg/kg**	**12.43**	**0.80J**
1,2-Benzenedicarboxylic acid, bis(2-met	**1**	**mg/kg**	**12.48**	**1.0J**
1,2-Benzenedicarboxylic acid, dipentyl	**1**	**mg/kg**	**12.52**	**2.1J**
1,2-Benzenedicarboxylic acid, butyl 8-m	**1**	**mg/kg**	**12.57**	**2.6J**
1,2-Benzenedicarboxylic acid, bis(2-met	**1**	**mg/kg**	**12.6**	**2.3J**
Cyclopropanenonanoic acid, 2-[(2-butylc	**1**	**mg/kg**	**12.65**	**1.3J**
unknown	**1**	**mg/kg**	**12.71**	**1.2J**
1,2-Benzenedicarboxylic acid, diheptyl	**1**	**mg/kg**	**12.76**	**0.85J**
unknown	**1**	**mg/kg**	**13.83**	**1.3J**
unknown	**1**	**mg/kg**	**14.84**	**0.80J**

28-NOR-17BETA(H)-HOPANE	**1**	**mg/kg**	**15.16**	**0.91J**
[4aS-(4a.alpha.,4b.beta.,7.alpha.,8.alp	**1**	**mg/kg**	**15.56**	**0.81J**
1,1,3,3-TETRAMETHYL-1,3-DISILAINDAN	**1**	**mg/kg**	**16.14**	**0.80J**
unknown	**1**	**mg/kg**	**4.06**	**2.9JB**
2-Pentanone, 4-hydroxy-4-methyl-	**1**	**mg/kg**	**4.39**	**73JAB**
TotalSemiVolatileTic	**1**	**mg/kg**	**NA**	**93J**

TAL Metals 6010

Analyte	DF	Units	RL	Result
Aluminum	**1**	**mg/kg**	**620**	**25000**
Barium	**1**	**mg/kg**	**31**	**1200**
Calcium	**1**	**mg/kg**	**3100**	**7400**
Chromium	**1**	**mg/kg**	**16**	**260**
Cobalt	**1**	**mg/kg**	**7.8**	**33**
Copper	**1**	**mg/kg**	**16**	**320**
Iron	**1**	**mg/kg**	**620**	**86000**
Lead	**1**	**mg/kg**	**16**	**3500**
Magnesium	**1**	**mg/kg**	**1600**	**7600**
Manganese	**1**	**mg/kg**	**31**	**500**
Nickel	**1**	**mg/kg**	**16**	**70**
Potassium	**1**	**mg/kg**	**1600**	**3400**
Sodium	**1**	**mg/kg**	**780**	**9600**
Vanadium	**1**	**mg/kg**	**31**	**190**
Zinc	**1**	**mg/kg**	**31**	**1000**

TAL Metals 6020

Analyte	DF	Units	RL	Result
Antimony	1	mg/kg	2.5	ND
Arsenic	**1**	**mg/kg**	**0.62**	**38**
Beryllium	**1**	**mg/kg**	**0.62**	**1.9**
Cadmium	**1**	**mg/kg**	**1.2**	**2.9**
Selenium	**1**	**mg/kg**	**6.3**	**7.5**
Silver	**1**	**mg/kg**	**0.62**	**1.5**
Thallium	1	mg/kg	1.2	ND

TOC (Region II/Kahn)

Analyte	DF	Units	RL	Result
Total Organic Carbon	**1**	**mg/kg**	**4100**	**230000**

Volatile Organics + 15 (8260)

Analyte	DF	Units	RL	Result
1,1,1-Trichloroethane	1.37	mg/kg	0.0086	ND
1,1,2,2-Tetrachloroethane	1.37	mg/kg	0.0086	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	1.37	mg/kg	0.0086	ND
1,1,2-Trichloroethane	1.37	mg/kg	0.0086	ND
1,1-Dichloroethane	1.37	mg/kg	0.0086	ND
1,1-Dichloroethene	1.37	mg/kg	0.0086	ND
1,2,3-Trichlorobenzene	1.37	mg/kg	0.0086	ND
1,2,4-Trichlorobenzene	1.37	mg/kg	0.0086	ND
1,2-Dibromo-3-chloropropane	1.37	mg/kg	0.0086	ND
1,2-Dibromoethane	1.37	mg/kg	0.0043	ND
1,2-Dichlorobenzene	1.37	mg/kg	0.0086	ND
1,2-Dichloroethane	1.37	mg/kg	0.0086	ND
1,2-Dichloropropane	1.37	mg/kg	0.0086	ND
1,3-Dichlorobenzene	1.37	mg/kg	0.0086	ND
1,4-Dichlorobenzene	1.37	mg/kg	0.0086	ND
1,4-Dioxane	1.37	mg/kg	0.43	ND
2-Butanone	1.37	mg/kg	0.0086	ND
2-Hexanone	1.37	mg/kg	0.0086	ND
4-Methyl-2-pentanone	1.37	mg/kg	0.0086	ND
Acetone	1.37	mg/kg	0.043	ND
Benzene	1.37	mg/kg	0.0043	ND
Bromochloromethane	1.37	mg/kg	0.0086	ND
Bromodichloromethane	1.37	mg/kg	0.0086	ND
Bromoform	1.37	mg/kg	0.0086	ND
Bromomethane	1.37	mg/kg	0.0086	ND
Carbon disulfide	1.37	mg/kg	0.0086	ND
Carbon tetrachloride	1.37	mg/kg	0.0086	ND

Sample ID: WCSB05 **Collection Date: 12/30/2016**
Lab#: AC95422-005 **Receipt Date: 12/30/2016**
Matrix: Soil/Encore

Chlorobenzene	1.37	mg/kg	0.0086	ND
Chloroethane	1.37	mg/kg	0.0086	ND
Chloroform	1.37	mg/kg	0.0086	ND
Chloromethane	1.37	mg/kg	0.0086	ND
cis-1,2-Dichloroethene	1.37	mg/kg	0.0086	ND
cis-1,3-Dichloropropene	1.37	mg/kg	0.0086	ND
Cyclohexane	1.37	mg/kg	0.0086	ND
Dibromochloromethane	1.37	mg/kg	0.0086	ND
Dichlorodifluoromethane	1.37	mg/kg	0.0086	ND
Ethylbenzene	1.37	mg/kg	0.0043	ND
Isopropylbenzene	1.37	mg/kg	0.0043	ND
m&p-Xylenes	1.37	mg/kg	0.0043	ND
Methyl Acetate	1.37	mg/kg	0.0086	ND
Methylcyclohexane	1.37	mg/kg	0.0086	ND
Methylene chloride	1.37	mg/kg	0.0086	ND
Methyl-t-butyl ether	1.37	mg/kg	0.0043	ND
o-Xylene	1.37	mg/kg	0.0043	ND
Styrene	1.37	mg/kg	0.0086	ND
Tetrachloroethene	1.37	mg/kg	0.0086	ND
Toluene	1.37	mg/kg	0.0043	ND
trans-1,2-Dichloroethene	1.37	mg/kg	0.0086	ND
trans-1,3-Dichloropropene	1.37	mg/kg	0.0086	ND
Trichloroethene	1.37	mg/kg	0.0086	ND
Trichlorofluoromethane	1.37	mg/kg	0.0086	ND
Vinyl chloride	1.37	mg/kg	0.0086	ND
Xylenes (Total)	1.37	mg/kg	0.0043	ND

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
Toluene-d8	30.72	30	68	122	102	
Dibromofluoromethane	34.51	30	63	140	115	
Bromofluorobenzene	26.65	30	64	129	89	
1,2-Dichloroethane-d4	31.75	30	63	143	106	

Volatile Organics + 15 (8260) Library Searches

Analyte	DF	Units	RT	Result
No Unknown Compounds Detected	1.37	mg/kg	NA	ND
TotalVolatileTic	1.37	mg/kg	NA	ND

Sample ID: WCSB06 | **Collection Date: 12/30/2016**
Lab#: AC95422-006 | **Receipt Date: 12/30/2016**
Matrix: Soil/Encore

% Solids SM2540G

Analyte	DF	Units	RL	Result
% Solids	**1**	**percent**		**35**

Cyanide (Soil/Waste) 9012B

Analyte	DF	Units	RL	Result
Cyanide	1	mg/kg	0.69	ND

Mercury (Soil/Waste) 7471B

Analyte	DF	Units	RL	Result
Mercury	**1**	**mg/kg**	**0.24**	**2.4**

Organochlorine Pesticides 8081

Analyte	DF	Units	RL	Result
a-Chlordane	1	mg/kg	0.014	ND
Aldrin	1	mg/kg	0.014	ND
Alpha-BHC	1	mg/kg	0.0029	ND
beta-BHC	1	mg/kg	0.0029	ND
Chlordane (Total)	1	mg/kg	0.014	ND
delta-BHC	1	mg/kg	0.014	ND
Dieldrin	1	mg/kg	0.0029	ND
Endosulfan I	1	mg/kg	0.014	ND
Endosulfan II	1	mg/kg	0.014	ND
Endosulfan Sulfate	1	mg/kg	0.014	ND
Endrin	1	mg/kg	0.014	ND
Endrin Aldehyde	1	mg/kg	0.014	ND
Endrin Ketone	1	mg/kg	0.014	ND
gamma-BHC	1	mg/kg	0.0029	ND
Heptachlor	1	mg/kg	0.014	ND
Heptachlor Epoxide	1	mg/kg	0.014	ND
Methoxychlor	1	mg/kg	0.014	ND
p,p'-DDD	1	mg/kg	0.0071	ND
p,p'-DDE	1	mg/kg	0.0071	ND
p,p'-DDT	1	mg/kg	0.0071	ND
Toxaphene	1	mg/kg	0.071	ND
y-Chlordane	1	mg/kg	0.014	ND

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
TCMX-Surrogate	103.85	100	37	141	104	
TCMX-Surrogate	103.33	100	37	141	103	
DCB-Surrogate	98.50	100	33	146	98	
DCB-Surrogate	91.54	100	33	146	92	

pH 9040C/9045D

Analyte	DF	Units	RL	Result
pH	**1**	**ph**		**6.5**

Semivolatile Organics + 15 (8270)

Analyte	DF	Units	RL	Result
1,1'-Biphenyl	1	mg/kg	0.095	ND
1,2,4,5-Tetrachlorobenzene	1	mg/kg	0.095	ND
2,3,4,6-Tetrachlorophenol	1	mg/kg	0.095	ND
2,4,5-Trichlorophenol	1	mg/kg	0.095	ND
2,4,6-Trichlorophenol	1	mg/kg	0.095	ND
2,4-Dichlorophenol	1	mg/kg	0.024	ND
2,4-Dimethylphenol	1	mg/kg	0.024	ND
2,4-Dinitrophenol	1	mg/kg	0.48	ND
2,4-Dinitrotoluene	1	mg/kg	0.095	ND
2,6-Dinitrotoluene	1	mg/kg	0.095	ND
2-Chloronaphthalene	1	mg/kg	0.095	ND
2-Chlorophenol	1	mg/kg	0.095	ND
2-Methylnaphthalene	1	mg/kg	0.095	ND
2-Methylphenol	1	mg/kg	0.024	ND
2-Nitroaniline	1	mg/kg	0.095	ND
2-Nitrophenol	1	mg/kg	0.095	ND
3&4-Methylphenol	1	mg/kg	0.024	ND
3,3'-Dichlorobenzidine	1	mg/kg	0.095	ND

3-Nitroaniline	1	mg/kg	0.095	ND
4,6-Dinitro-2-methylphenol	1	mg/kg	0.48	ND
4-Bromophenyl-phenylether	1	mg/kg	0.095	ND
4-Chloro-3-methylphenol	1	mg/kg	0.095	ND
4-Chloroaniline	1	mg/kg	0.024	ND
4-Chlorophenyl-phenylether	1	mg/kg	0.095	ND
4-Nitroaniline	1	mg/kg	0.095	ND
4-Nitrophenol	1	mg/kg	0.095	ND
Acenaphthene	1	mg/kg	0.095	ND
Acenaphthylene	1	mg/kg	0.095	ND
Acetophenone	1	mg/kg	0.095	ND
Anthracene	1	mg/kg	0.095	ND
Atrazine	1	mg/kg	0.095	ND
Benzaldehyde	1	mg/kg	0.095	ND
Benzo[a]anthracene	**1**	**mg/kg**	**0.095**	**0.14**
Benzo[a]pyrene	**1**	**mg/kg**	**0.095**	**0.21**
Benzo[b]fluoranthene	**1**	**mg/kg**	**0.095**	**0.34**
Benzo[g,h,i]perylene	**1**	**mg/kg**	**0.095**	**0.22**
Benzo[k]fluoranthene	**1**	**mg/kg**	**0.095**	**0.13**
bis(2-Chloroethoxy)methane	1	mg/kg	0.095	ND
bis(2-Chloroethyl)ether	1	mg/kg	0.024	ND
bis(2-Chloroisopropyl)ether	1	mg/kg	0.095	ND
bis(2-Ethylhexyl)phthalate	**1**	**mg/kg**	**0.095**	**0.28**
Butylbenzylphthalate	1	mg/kg	0.095	ND
Caprolactam	1	mg/kg	0.095	ND
Carbazole	1	mg/kg	0.095	ND
Chrysene	**1**	**mg/kg**	**0.095**	**0.23**
Dibenzo[a,h]anthracene	1	mg/kg	0.095	ND
Dibenzofuran	1	mg/kg	0.024	ND
Diethylphthalate	1	mg/kg	0.095	ND
Dimethylphthalate	1	mg/kg	0.095	ND
Di-n-butylphthalate	1	mg/kg	0.024	ND
Di-n-octylphthalate	1	mg/kg	0.095	ND
Fluoranthene	**1**	**mg/kg**	**0.095**	**0.31**
Fluorene	1	mg/kg	0.095	ND
Hexachlorobenzene	1	mg/kg	0.095	ND
Hexachlorobutadiene	1	mg/kg	0.095	ND
Hexachlorocyclopentadiene	1	mg/kg	0.22	ND
Hexachloroethane	1	mg/kg	0.095	ND
Indeno[1,2,3-cd]pyrene	**1**	**mg/kg**	**0.095**	**0.18**
Isophorone	1	mg/kg	0.095	ND
Naphthalene	1	mg/kg	0.024	ND
Nitrobenzene	1	mg/kg	0.095	ND
N-Nitroso-di-n-propylamine	1	mg/kg	0.024	ND
N-Nitrosodiphenylamine	1	mg/kg	0.095	ND
Pentachlorophenol	1	mg/kg	0.48	ND
Phenanthrene	1	mg/kg	0.095	ND
Phenol	1	mg/kg	0.095	ND
Pyrene	**1**	**mg/kg**	**0.095**	**0.28**

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
Terphenyl-d14	27.43	50	58	148	55	Sb8
Phenol-d5	66.71	100	49	129	67	
Nitrobenzene-d5	29.57	50	52	129	59	
2-Fluorophenol	68.01	100	43	128	68	
2-Fluorobiphenyl	28.70	50	58	125	57	Sb8
2,4,6-Tribromophenol	63.22	100	54	145	63	

Semivolatile Organics + 15 (8270) Library Searches

Analyte	DF	Units	RT	Result
Octadecane, 1-chloro-	**1**	**mg/kg**	**12.7**	**0.65J**
Eicosane	**1**	**mg/kg**	**13.46**	**1.1J**
Tridecane, 7-hexyl-	**1**	**mg/kg**	**14.18**	**0.88J**
Benzo[j]fluoranthene	**1**	**mg/kg**	**14.36**	**0.50J**
(Z)14-TRICOSENYL FORMATE	**1**	**mg/kg**	**14.75**	**0.48J**
unknown	**1**	**mg/kg**	**14.97**	**0.62J**
1-Nonadecene	**1**	**mg/kg**	**15.03**	**0.72J**
Vitamin E	**1**	**mg/kg**	**15.21**	**0.74J**
Anthracene, 9-dodecyltetradecahydro-	**1**	**mg/kg**	**15.54**	**1.0J**
12-Octadecenal	**1**	**mg/kg**	**15.68**	**1.3J**

1-Octadecene	**1**	**mg/kg**	**16.03**	**3.3J**
Stigmast-5-en-3-ol, (3.beta.,24S)-	**1**	**mg/kg**	**16.37**	**1.3J**
1,2-Propanediol	**1**	**mg/kg**	**3.03**	**0.69J**
unknown	**1**	**mg/kg**	**4.05**	**1.4JB**
2-Pentanone, 4-hydroxy-4-methyl-	**1**	**mg/kg**	**4.36**	**44JAB**
TotalSemiVolatileTic	**1**	**mg/kg**	**NA**	**59J**

TAL Metals 6010

Analyte	DF	Units	RL	Result
Aluminum	**1**	**mg/kg**	**570**	**55000**
Barium	**1**	**mg/kg**	**29**	**83**
Calcium	**1**	**mg/kg**	**2900**	**4900**
Chromium	**1**	**mg/kg**	**14**	**380**
Cobalt	**1**	**mg/kg**	**7.1**	**49**
Copper	**1**	**mg/kg**	**14**	**260**
Iron	**1**	**mg/kg**	**570**	**150000**
Lead	**1**	**mg/kg**	**14**	**360**
Magnesium	**1**	**mg/kg**	**1400**	**11000**
Manganese	**1**	**mg/kg**	**29**	**1100**
Nickel	**1**	**mg/kg**	**14**	**94**
Potassium	**1**	**mg/kg**	**1400**	**5500**
Sodium	**1**	**mg/kg**	**710**	**20000**
Vanadium	**1**	**mg/kg**	**29**	**160**
Zinc	**1**	**mg/kg**	**29**	**690**

TAL Metals 6020

Analyte	DF	Units	RL	Result
Antimony	1	mg/kg	2.3	ND
Arsenic	**1**	**mg/kg**	**0.57**	**100**
Beryllium	**2**	**mg/kg**	**1.1**	**4.7**
Cadmium	1	mg/kg	1.1	ND
Selenium	**1**	**mg/kg**	**5.7**	**16**
Silver	**1**	**mg/kg**	**0.57**	**2.0**
Thallium	1	mg/kg	1.1	ND

TOC (Region II/Kahn)

Analyte	DF	Units	RL	Result
Total Organic Carbon	**1**	**mg/kg**	**3700**	**40000**

Volatile Organics + 15 (8260)

Analyte	DF	Units	RL	Result
1,1,1-Trichloroethane	1.52	mg/kg	0.0087	ND
1,1,2,2-Tetrachloroethane	1.52	mg/kg	0.0087	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	1.52	mg/kg	0.0087	ND
1,1,2-Trichloroethane	1.52	mg/kg	0.0087	ND
1,1-Dichloroethane	1.52	mg/kg	0.0087	ND
1,1-Dichloroethene	1.52	mg/kg	0.0087	ND
1,2,3-Trichlorobenzene	1.52	mg/kg	0.0087	ND
1,2,4-Trichlorobenzene	1.52	mg/kg	0.0087	ND
1,2-Dibromo-3-chloropropane	1.52	mg/kg	0.0087	ND
1,2-Dibromoethane	1.52	mg/kg	0.0043	ND
1,2-Dichlorobenzene	1.52	mg/kg	0.0087	ND
1,2-Dichloroethane	1.52	mg/kg	0.0087	ND
1,2-Dichloropropane	1.52	mg/kg	0.0087	ND
1,3-Dichlorobenzene	1.52	mg/kg	0.0087	ND
1,4-Dichlorobenzene	1.52	mg/kg	0.0087	ND
1,4-Dioxane	1.52	mg/kg	0.43	ND
2-Butanone	1.52	mg/kg	0.0087	ND
2-Hexanone	1.52	mg/kg	0.0087	ND
4-Methyl-2-pentanone	1.52	mg/kg	0.0087	ND
Acetone	1.52	mg/kg	0.043	ND
Benzene	1.52	mg/kg	0.0043	ND
Bromochloromethane	1.52	mg/kg	0.0087	ND
Bromodichloromethane	1.52	mg/kg	0.0087	ND
Bromoform	1.52	mg/kg	0.0087	ND
Bromomethane	1.52	mg/kg	0.0087	ND
Carbon disulfide	1.52	mg/kg	0.0087	ND
Carbon tetrachloride	1.52	mg/kg	0.0087	ND

Sample ID: WCSB06 | **Collection Date: 12/30/2016**
Lab#: AC95422-006 | **Receipt Date: 12/30/2016**
Matrix: Soil/Encore

Chlorobenzene	1.52	mg/kg	0.0087	ND	
Chloroethane	1.52	mg/kg	0.0087	ND	
Chloroform	1.52	mg/kg	0.0087	ND	
Chloromethane	1.52	mg/kg	0.0087	ND	
cis-1,2-Dichloroethene	1.52	mg/kg	0.0087	ND	
cis-1,3-Dichloropropene	1.52	mg/kg	0.0087	ND	
Cyclohexane	1.52	mg/kg	0.0087	ND	
Dibromochloromethane	1.52	mg/kg	0.0087	ND	
Dichlorodifluoromethane	1.52	mg/kg	0.0087	ND	
Ethylbenzene	1.52	mg/kg	0.0043	ND	
Isopropylbenzene	1.52	mg/kg	0.0043	ND	
m&p-Xylenes	1.52	mg/kg	0.0043	ND	
Methyl Acetate	1.52	mg/kg	0.0087	ND	
Methylcyclohexane	1.52	mg/kg	0.0087	ND	
Methylene chloride	1.52	mg/kg	0.0087	ND	
Methyl-t-butyl ether	1.52	mg/kg	0.0043	ND	
o-Xylene	1.52	mg/kg	0.0043	ND	
Styrene	1.52	mg/kg	0.0087	ND	
Tetrachloroethene	1.52	mg/kg	0.0087	ND	
Toluene	1.52	mg/kg	0.0043	ND	
trans-1,2-Dichloroethene	1.52	mg/kg	0.0087	ND	
trans-1,3-Dichloropropene	1.52	mg/kg	0.0087	ND	
Trichloroethene	1.52	mg/kg	0.0087	ND	
Trichlorofluoromethane	1.52	mg/kg	0.0087	ND	
Vinyl chloride	1.52	mg/kg	0.0087	ND	
Xylenes (Total)	1.52	mg/kg	0.0043	ND	

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
Toluene-d8	24.92	30	68	122	83	
Dibromofluoromethane	38.95	30	63	140	130	
Bromofluorobenzene	30.89	30	64	129	103	
1,2-Dichloroethane-d4	31.13	30	63	143	104	

Volatile Organics + 15 (8260) Library Searches

Analyte	DF	Units	RT	Result
No Unknown Compounds Detected	1.52	mg/kg	NA	ND
TotalVolatileTic	1.52	mg/kg	NA	ND

Sample ID: WCSB07 | **Collection Date: 12/30/2016**
Lab#: AC95422-007 | **Receipt Date: 12/30/2016**
Matrix: Soil/Encore

% Solids SM2540G

Analyte	DF	Units	RL	Result
% Solids	**1**	**percent**		**39**

Cyanide (Soil/Waste) 9012B

Analyte	DF	Units	RL	Result
Cyanide	1	mg/kg	0.62	ND

Mercury (Soil/Waste) 7471B

Analyte	DF	Units	RL	Result
Mercury	**1**	**mg/kg**	**0.21**	**2.6**

Organochlorine Pesticides 8081

Analyte	DF	Units	RL	Result
a-Chlordane	1	mg/kg	0.013	ND
Aldrin	1	mg/kg	0.013	ND
Alpha-BHC	1	mg/kg	0.0026	ND
beta-BHC	1	mg/kg	0.0026	ND
Chlordane (Total)	1	mg/kg	0.013	ND
delta-BHC	1	mg/kg	0.013	ND
Dieldrin	1	mg/kg	0.0026	ND
Endosulfan I	1	mg/kg	0.013	ND
Endosulfan II	1	mg/kg	0.013	ND
Endosulfan Sulfate	1	mg/kg	0.013	ND
Endrin	1	mg/kg	0.013	ND
Endrin Aldehyde	1	mg/kg	0.013	ND
Endrin Ketone	1	mg/kg	0.013	ND
gamma-BHC	1	mg/kg	0.0026	ND
Heptachlor	1	mg/kg	0.013	ND
Heptachlor Epoxide	1	mg/kg	0.013	ND
Methoxychlor	1	mg/kg	0.013	ND
p,p'-DDD	**1**	**mg/kg**	**0.0064**	**0.0075**
p,p'-DDE	**1**	**mg/kg**	**0.0064**	**0.0067d**
p,p'-DDT	1	mg/kg	0.0064	ND
Toxaphene	1	mg/kg	0.064	ND
y-Chlordane	1	mg/kg	0.013	ND

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
TCMX-Surrogate	102.42	100	37	141	102	
TCMX-Surrogate	104.91	100	37	141	105	
DCB-Surrogate	98.96	100	33	146	99	
DCB-Surrogate	87.46	100	33	146	87	

pH 9040C/9045D

Analyte	DF	Units	RL	Result
pH	**1**	**ph**		**6.6**

Semivolatile Organics + 15 (8270)

Analyte	DF	Units	RL	Result
1,1'-Biphenyl	3	mg/kg	0.26	ND
1,2,4,5-Tetrachlorobenzene	3	mg/kg	0.26	ND
2,3,4,6-Tetrachlorophenol	3	mg/kg	0.26	ND
2,4,5-Trichlorophenol	3	mg/kg	0.26	ND
2,4,6-Trichlorophenol	3	mg/kg	0.26	ND
2,4-Dichlorophenol	3	mg/kg	0.064	ND
2,4-Dimethylphenol	3	mg/kg	0.064	ND
2,4-Dinitrophenol	3	mg/kg	1.3	ND
2,4-Dinitrotoluene	3	mg/kg	0.26	ND
2,6-Dinitrotoluene	3	mg/kg	0.26	ND
2-Chloronaphthalene	3	mg/kg	0.26	ND
2-Chlorophenol	3	mg/kg	0.26	ND
2-Methylnaphthalene	3	mg/kg	0.26	ND
2-Methylphenol	3	mg/kg	0.064	ND
2-Nitroaniline	3	mg/kg	0.26	ND
2-Nitrophenol	3	mg/kg	0.26	ND
3&4-Methylphenol	3	mg/kg	0.064	ND
3,3'-Dichlorobenzidine	3	mg/kg	0.26	ND

3-Nitroaniline	3	mg/kg	0.26	ND
4,6-Dinitro-2-methylphenol	3	mg/kg	1.3	ND
4-Bromophenyl-phenylether	3	mg/kg	0.26	ND
4-Chloro-3-methylphenol	3	mg/kg	0.26	ND
4-Chloroaniline	3	mg/kg	0.064	ND
4-Chlorophenyl-phenylether	3	mg/kg	0.26	ND
4-Nitroaniline	3	mg/kg	0.26	ND
4-Nitrophenol	3	mg/kg	0.26	ND
Acenaphthene	3	mg/kg	0.26	ND
Acenaphthylene	3	mg/kg	0.26	ND
Acetophenone	3	mg/kg	0.26	ND
Anthracene	3	mg/kg	0.26	ND
Atrazine	3	mg/kg	0.26	ND
Benzaldehyde	3	mg/kg	0.26	ND
Benzo[a]anthracene	3	mg/kg	0.26	ND
Benzo[a]pyrene	3	mg/kg	0.26	ND
Benzo[b]fluoranthene	3	mg/kg	0.26	ND
Benzo[g,h,i]perylene	3	mg/kg	0.26	ND
Benzo[k]fluoranthene	3	mg/kg	0.26	ND
bis(2-Chloroethoxy)methane	3	mg/kg	0.26	ND
bis(2-Chloroethyl)ether	3	mg/kg	0.064	ND
bis(2-Chloroisopropyl)ether	3	mg/kg	0.26	ND
bis(2-Ethylhexyl)phthalate	3	mg/kg	0.26	ND
Butylbenzylphthalate	3	mg/kg	0.26	ND
Caprolactam	3	mg/kg	0.26	ND
Carbazole	3	mg/kg	0.26	ND
Chrysene	3	mg/kg	0.26	ND
Dibenzo[a,h]anthracene	3	mg/kg	0.26	ND
Dibenzofuran	3	mg/kg	0.064	ND
Diethylphthalate	3	mg/kg	0.26	ND
Dimethylphthalate	3	mg/kg	0.26	ND
Di-n-butylphthalate	3	mg/kg	0.064	ND
Di-n-octylphthalate	3	mg/kg	0.26	ND
Fluoranthene	3	mg/kg	0.26	ND
Fluorene	3	mg/kg	0.26	ND
Hexachlorobenzene	3	mg/kg	0.26	ND
Hexachlorobutadiene	3	mg/kg	0.26	ND
Hexachlorocyclopentadiene	3	mg/kg	0.60	ND
Hexachloroethane	3	mg/kg	0.26	ND
Indeno[1,2,3-cd]pyrene	3	mg/kg	0.26	ND
Isophorone	3	mg/kg	0.26	ND
Naphthalene	3	mg/kg	0.064	ND
Nitrobenzene	3	mg/kg	0.26	ND
N-Nitroso-di-n-propylamine	3	mg/kg	0.064	ND
N-Nitrosodiphenylamine	3	mg/kg	0.26	ND
Pentachlorophenol	3	mg/kg	1.3	ND
Phenanthrene	3	mg/kg	0.26	ND
Phenol	3	mg/kg	0.26	ND
Pyrene	3	mg/kg	0.26	ND

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
Terphenyl-d14	9.56	50	58	148	57	Sb8
Phenol-d5	21.36	100	49	129	64	
Nitrobenzene-d5	9.62	50	52	129	58	
2-Fluorophenol	21.60	100	43	128	65	
2-Fluorobiphenyl	9.72	50	58	125	58	
2,4,6-Tribromophenol	20.51	100	54	145	62	

Semivolatile Organics + 15 (8270) Library Searches

Analyte	DF	Units	RT	Result
Eicosane	**3**	**mg/kg**	**13.46**	**0.56J**
Perylene	**3**	**mg/kg**	**14.05**	**0.66J**
Hexadecane	**3**	**mg/kg**	**14.18**	**1.2J**
unknown	**3**	**mg/kg**	**14.97**	**0.83J**
Cholest-5-en-3-ol (3.beta.)-	**3**	**mg/kg**	**15.35**	**0.91J**
unknown	**3**	**mg/kg**	**15.41**	**0.55J**
unknown	**3**	**mg/kg**	**15.72**	**1.0J**
unknown	**3**	**mg/kg**	**15.88**	**1.2J**
unknown	**3**	**mg/kg**	**15.99**	**1.0J**
Stigmast-5-en-3-ol, (3.beta.,24S)-	**3**	**mg/kg**	**16.38**	**0.98J**

unknown	**3**	**mg/kg**	**16.42**	**1.5J**
unknown	**3**	**mg/kg**	**16.54**	**0.97J**
unknown	**3**	**mg/kg**	**16.67**	**0.59J**
unknown	**3**	**mg/kg**	**4.05**	**2.0JB**
2-Pentanone, 4-hydroxy-4-methyl-	**3**	**mg/kg**	**4.34**	**70JAB**
TotalSemiVolatileTic	**3**	**mg/kg**	**NA**	**84J**

TAL Metals 6010

Analyte	DF	Units	RL	Result
Aluminum	**1**	**mg/kg**	**510**	**35000**
Barium	**1**	**mg/kg**	**26**	**79**
Calcium	**1**	**mg/kg**	**2600**	**4400**
Chromium	**1**	**mg/kg**	**13**	**170**
Cobalt	**1**	**mg/kg**	**6.4**	**23**
Copper	**1**	**mg/kg**	**13**	**180**
Iron	**1**	**mg/kg**	**510**	**79000**
Lead	**1**	**mg/kg**	**13**	**260**
Magnesium	**1**	**mg/kg**	**1300**	**11000**
Manganese	**1**	**mg/kg**	**26**	**650**
Nickel	**1**	**mg/kg**	**13**	**56**
Potassium	**1**	**mg/kg**	**1300**	**5600**
Sodium	**1**	**mg/kg**	**640**	**19000**
Vanadium	**1**	**mg/kg**	**26**	**120**
Zinc	**1**	**mg/kg**	**26**	**500**

TAL Metals 6020

Analyte	DF	Units	RL	Result
Antimony	1	mg/kg	2.1	ND
Arsenic	**1**	**mg/kg**	**0.51**	**30**
Beryllium	**1**	**mg/kg**	**0.51**	**1.6**
Cadmium	1	mg/kg	1.0	ND
Selenium	1	mg/kg	5.1	ND
Silver	**1**	**mg/kg**	**0.51**	**1.1**
Thallium	1	mg/kg	1.0	ND

TOC (Region II/Kahn)

Analyte	DF	Units	RL	Result
Total Organic Carbon	**1**	**mg/kg**	**3300**	**42000**

Volatile Organics + 15 (8260)

Analyte	DF	Units	RL	Result
1,1,1-Trichloroethane	1.58	mg/kg	0.0081	ND
1,1,2,2-Tetrachloroethane	1.58	mg/kg	0.0081	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	1.58	mg/kg	0.0081	ND
1,1,2-Trichloroethane	1.58	mg/kg	0.0081	ND
1,1-Dichloroethane	1.58	mg/kg	0.0081	ND
1,1-Dichloroethene	1.58	mg/kg	0.0081	ND
1,2,3-Trichlorobenzene	1.58	mg/kg	0.0081	ND
1,2,4-Trichlorobenzene	1.58	mg/kg	0.0081	ND
1,2-Dibromo-3-chloropropane	1.58	mg/kg	0.0081	ND
1,2-Dibromoethane	1.58	mg/kg	0.0040	ND
1,2-Dichlorobenzene	1.58	mg/kg	0.0081	ND
1,2-Dichloroethane	1.58	mg/kg	0.0081	ND
1,2-Dichloropropane	1.58	mg/kg	0.0081	ND
1,3-Dichlorobenzene	1.58	mg/kg	0.0081	ND
1,4-Dichlorobenzene	1.58	mg/kg	0.0081	ND
1,4-Dioxane	1.58	mg/kg	0.40	ND
2-Butanone	1.58	mg/kg	0.0081	ND
2-Hexanone	1.58	mg/kg	0.0081	ND
4-Methyl-2-pentanone	1.58	mg/kg	0.0081	ND
Acetone	1.58	mg/kg	0.040	ND
Benzene	1.58	mg/kg	0.0040	ND
Bromochloromethane	1.58	mg/kg	0.0081	ND
Bromodichloromethane	1.58	mg/kg	0.0081	ND
Bromoform	1.58	mg/kg	0.0081	ND
Bromomethane	1.58	mg/kg	0.0081	ND
Carbon disulfide	1.58	mg/kg	0.0081	ND
Carbon tetrachloride	1.58	mg/kg	0.0081	ND

Sample ID: WCSB07 **Collection Date: 12/30/2016**
Lab#: AC95422-007 **Receipt Date: 12/30/2016**
Matrix: Soil/Encore

Chlorobenzene	1.58	mg/kg	0.0081	ND	
Chloroethane	1.58	mg/kg	0.0081	ND	
Chloroform	1.58	mg/kg	0.0081	ND	
Chloromethane	1.58	mg/kg	0.0081	ND	
cis-1,2-Dichloroethene	1.58	mg/kg	0.0081	ND	
cis-1,3-Dichloropropene	1.58	mg/kg	0.0081	ND	
Cyclohexane	1.58	mg/kg	0.0081	ND	
Dibromochloromethane	1.58	mg/kg	0.0081	ND	
Dichlorodifluoromethane	1.58	mg/kg	0.0081	ND	
Ethylbenzene	1.58	mg/kg	0.0040	ND	
Isopropylbenzene	1.58	mg/kg	0.0040	ND	
m&p-Xylenes	1.58	mg/kg	0.0040	ND	
Methyl Acetate	1.58	mg/kg	0.0081	ND	
Methylcyclohexane	1.58	mg/kg	0.0081	ND	
Methylene chloride	1.58	mg/kg	0.0081	ND	
Methyl-t-butyl ether	1.58	mg/kg	0.0040	ND	
o-Xylene	1.58	mg/kg	0.0040	ND	
Styrene	1.58	mg/kg	0.0081	ND	
Tetrachloroethene	1.58	mg/kg	0.0081	ND	
Toluene	1.58	mg/kg	0.0040	ND	
trans-1,2-Dichloroethene	1.58	mg/kg	0.0081	ND	
trans-1,3-Dichloropropene	1.58	mg/kg	0.0081	ND	
Trichloroethene	1.58	mg/kg	0.0081	ND	
Trichlorofluoromethane	1.58	mg/kg	0.0081	ND	
Vinyl chloride	1.58	mg/kg	0.0081	ND	
Xylenes (Total)	1.58	mg/kg	0.0040	ND	

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
Toluene-d8	23.32	30	68	122	78	
Dibromofluoromethane	37.54	30	63	140	125	
Bromofluorobenzene	30.40	30	64	129	101	
1,2-Dichloroethane-d4	37.15	30	63	143	124	

Volatile Organics + 15 (8260) Library Searches

Analyte	DF	Units	RT	Result
Methane, thiobis-	**1.58**	**mg/kg**	**2.78**	**0.097J**
unknown	**1.58**	**mg/kg**	**8.37**	**0.024J**
TotalVolatileTic	**1.58**	**mg/kg**	**NA**	**0.12J**

Sample ID: WCSB08 | **Collection Date: 12/30/2016**
Lab#: AC95422-008 | **Receipt Date: 12/30/2016**
Matrix: Soil/Encore

% Solids SM2540G

Analyte	DF	Units	RL	Result
% Solids	**1**	**percent**		**33**

Cyanide (Soil/Waste) 9012B

Analyte	DF	Units	RL	Result
Cyanide	1	mg/kg	0.73	ND

Mercury (Soil/Waste) 7471B

Analyte	DF	Units	RL	Result
Mercury	**1**	**mg/kg**	**0.25**	**2.6**

Organochlorine Pesticides 8081

Analyte	DF	Units	RL	Result
a-Chlordane	1	mg/kg	0.015	ND
Aldrin	1	mg/kg	0.015	ND
Alpha-BHC	1	mg/kg	0.0030	ND
beta-BHC	1	mg/kg	0.0030	ND
Chlordane (Total)	1	mg/kg	0.015	ND
delta-BHC	1	mg/kg	0.015	ND
Dieldrin	1	mg/kg	0.0030	ND
Endosulfan I	1	mg/kg	0.015	ND
Endosulfan II	1	mg/kg	0.015	ND
Endosulfan Sulfate	1	mg/kg	0.015	ND
Endrin	1	mg/kg	0.015	ND
Endrin Aldehyde	1	mg/kg	0.015	ND
Endrin Ketone	1	mg/kg	0.015	ND
gamma-BHC	1	mg/kg	0.0030	ND
Heptachlor	1	mg/kg	0.015	ND
Heptachlor Epoxide	1	mg/kg	0.015	ND
Methoxychlor	1	mg/kg	0.015	ND
p,p'-DDD	**1**	**mg/kg**	**0.0076**	**0.0084**
p,p'-DDE	1	mg/kg	0.0076	ND
p,p'-DDT	1	mg/kg	0.0076	ND
Toxaphene	1	mg/kg	0.076	ND
y-Chlordane	1	mg/kg	0.015	ND

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
TCMX-Surrogate	99.93	100	37	141	100	
TCMX-Surrogate	101.04	100	37	141	101	
DCB-Surrogate	145.32	100	33	146	145	
DCB-Surrogate	88.40	100	33	146	88	

pH 9040C/9045D

Analyte	DF	Units	RL	Result
pH	**1**	**ph**		**6.4**

Semivolatile Organics + 15 (8270)

Analyte	DF	Units	RL	Result
1,1'-Biphenyl	3	mg/kg	0.30	ND
1,2,4,5-Tetrachlorobenzene	3	mg/kg	0.30	ND
2,3,4,6-Tetrachlorophenol	3	mg/kg	0.30	ND
2,4,5-Trichlorophenol	3	mg/kg	0.30	ND
2,4,6-Trichlorophenol	3	mg/kg	0.30	ND
2,4-Dichlorophenol	3	mg/kg	0.076	ND
2,4-Dimethylphenol	3	mg/kg	0.076	ND
2,4-Dinitrophenol	3	mg/kg	1.5	ND
2,4-Dinitrotoluene	3	mg/kg	0.30	ND
2,6-Dinitrotoluene	3	mg/kg	0.30	ND
2-Chloronaphthalene	3	mg/kg	0.30	ND
2-Chlorophenol	3	mg/kg	0.30	ND
2-Methylnaphthalene	3	mg/kg	0.30	ND
2-Methylphenol	3	mg/kg	0.076	ND
2-Nitroaniline	3	mg/kg	0.30	ND
2-Nitrophenol	3	mg/kg	0.30	ND
3&4-Methylphenol	3	mg/kg	0.076	ND
3,3'-Dichlorobenzidine	3	mg/kg	0.30	ND

Sample ID: WCSB08 **Collection Date: 12/30/2016**
Lab#: AC95422-008 **Receipt Date: 12/30/2016**
Matrix: Soil/Encore

3-Nitroaniline	3	mg/kg	0.30	ND
4,6-Dinitro-2-methylphenol	3	mg/kg	1.5	ND
4-Bromophenyl-phenylether	3	mg/kg	0.30	ND
4-Chloro-3-methylphenol	3	mg/kg	0.30	ND
4-Chloroaniline	3	mg/kg	0.076	ND
4-Chlorophenyl-phenylether	3	mg/kg	0.30	ND
4-Nitroaniline	3	mg/kg	0.30	ND
4-Nitrophenol	3	mg/kg	0.30	ND
Acenaphthene	3	mg/kg	0.30	ND
Acenaphthylene	3	mg/kg	0.30	ND
Acetophenone	3	mg/kg	0.30	ND
Anthracene	3	mg/kg	0.30	ND
Atrazine	3	mg/kg	0.30	ND
Benzaldehyde	3	mg/kg	0.30	ND
Benzo[a]anthracene	3	mg/kg	0.30	ND
Benzo[a]pyrene	3	mg/kg	0.30	ND
Benzo[b]fluoranthene	**3**	**mg/kg**	**0.30**	**0.31**
Benzo[g,h,i]perylene	3	mg/kg	0.30	ND
Benzo[k]fluoranthene	3	mg/kg	0.30	ND
bis(2-Chloroethoxy)methane	3	mg/kg	0.30	ND
bis(2-Chloroethyl)ether	3	mg/kg	0.076	ND
bis(2-Chloroisopropyl)ether	3	mg/kg	0.30	ND
bis(2-Ethylhexyl)phthalate	3	mg/kg	0.30	ND
Butylbenzylphthalate	3	mg/kg	0.30	ND
Caprolactam	3	mg/kg	0.30	ND
Carbazole	3	mg/kg	0.30	ND
Chrysene	3	mg/kg	0.30	ND
Dibenzo[a,h]anthracene	3	mg/kg	0.30	ND
Dibenzofuran	3	mg/kg	0.076	ND
Diethylphthalate	3	mg/kg	0.30	ND
Dimethylphthalate	3	mg/kg	0.30	ND
Di-n-butylphthalate	3	mg/kg	0.076	ND
Di-n-octylphthalate	3	mg/kg	0.30	ND
Fluoranthene	3	mg/kg	0.30	ND
Fluorene	3	mg/kg	0.30	ND
Hexachlorobenzene	3	mg/kg	0.30	ND
Hexachlorobutadiene	3	mg/kg	0.30	ND
Hexachlorocyclopentadiene	3	mg/kg	0.71	ND
Hexachloroethane	3	mg/kg	0.30	ND
Indeno[1,2,3-cd]pyrene	3	mg/kg	0.30	ND
Isophorone	3	mg/kg	0.30	ND
Naphthalene	3	mg/kg	0.076	ND
Nitrobenzene	3	mg/kg	0.30	ND
N-Nitroso-di-n-propylamine	3	mg/kg	0.076	ND
N-Nitrosodiphenylamine	3	mg/kg	0.30	ND
Pentachlorophenol	3	mg/kg	1.5	ND
Phenanthrene	3	mg/kg	0.30	ND
Phenol	3	mg/kg	0.30	ND
Pyrene	3	mg/kg	0.30	ND

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
Terphenyl-d14	9.96	50	58	148	60	
Phenol-d5	20.68	100	49	129	62	
Nitrobenzene-d5	9.74	50	52	129	58	
2-Fluorophenol	20.88	100	43	128	63	
2-Fluorobiphenyl	9.54	50	58	125	57	Sb8
2,4,6-Tribromophenol	20.59	100	54	145	62	

Semivolatile Organics + 15 (8270) Library Searches

Analyte	DF	Units	RT	Result
Hexatriacontane	**3**	**mg/kg**	**12.7**	**1.4J**
Heptadecane	**3**	**mg/kg**	**13.46**	**2.1J**
Eicosane	**3**	**mg/kg**	**14.18**	**1.7J**
unknown	**3**	**mg/kg**	**14.97**	**1.3J**
Vitamin E	**3**	**mg/kg**	**15.21**	**1.9J**
unknown	**3**	**mg/kg**	**15.34**	**1.1J**
unknown	**3**	**mg/kg**	**15.54**	**1.3J**
unknown	**3**	**mg/kg**	**15.89**	**2.0J**
unknown	**3**	**mg/kg**	**16**	**0.79J**
unknown	**3**	**mg/kg**	**16.05**	**2.0J**

Stigmast-5-en-3-ol, (3.beta.,24S)-	**3**	**mg/kg**	**16.37**	**2.4J**
unknown	**3**	**mg/kg**	**16.54**	**1.5J**
5.ALPHA.-STIGMAST-3-ONE	**3**	**mg/kg**	**16.69**	**2.2J**
unknown	**3**	**mg/kg**	**4.05**	**3.1JY**
2-Pentanone, 4-hydroxy-4-methyl-	**3**	**mg/kg**	**4.34**	**110JAY**
TotalSemiVolatileTic	**3**	**mg/kg**	**NA**	**130J**

TAL Metals 6010

Analyte	DF	Units	RL	Result
Aluminum	**1**	**mg/kg**	**610**	**35000**
Barium	**1**	**mg/kg**	**30**	**88**
Calcium	**1**	**mg/kg**	**3000**	**4600**
Chromium	**1**	**mg/kg**	**15**	**230**
Cobalt	**1**	**mg/kg**	**7.6**	**23**
Copper	**1**	**mg/kg**	**15**	**190**
Iron	**1**	**mg/kg**	**610**	**69000**
Lead	**1**	**mg/kg**	**15**	**290**
Magnesium	**1**	**mg/kg**	**1500**	**12000**
Manganese	**1**	**mg/kg**	**30**	**400**
Nickel	**1**	**mg/kg**	**15**	**62**
Potassium	**1**	**mg/kg**	**1500**	**6500**
Sodium	**1**	**mg/kg**	**760**	**25000**
Vanadium	**1**	**mg/kg**	**30**	**130**
Zinc	**1**	**mg/kg**	**30**	**500**

TAL Metals 6020

Analyte	DF	Units	RL	Result
Antimony	**1**	**mg/kg**	**2.4**	**18**
Arsenic	**1**	**mg/kg**	**0.61**	**35**
Beryllium	**1**	**mg/kg**	**0.61**	**19**
Cadmium	**1**	**mg/kg**	**1.2**	**20**
Selenium	**1**	**mg/kg**	**6.1**	**19**
Silver	1	mg/kg	0.61	ND
Thallium	**1**	**mg/kg**	**1.2**	**18**

TOC (Region II/Kahn)

Analyte	DF	Units	RL	Result
Total Organic Carbon	**1**	**mg/kg**	**3900**	**51000**

Volatile Organics + 15 (8260)

Analyte	DF	Units	RL	Result
1,1,1-Trichloroethane	1.73	mg/kg	0.010	ND
1,1,2,2-Tetrachloroethane	1.73	mg/kg	0.010	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	1.73	mg/kg	0.010	ND
1,1,2-Trichloroethane	1.73	mg/kg	0.010	ND
1,1-Dichloroethane	1.73	mg/kg	0.010	ND
1,1-Dichloroethene	1.73	mg/kg	0.010	ND
1,2,3-Trichlorobenzene	1.73	mg/kg	0.010	ND
1,2,4-Trichlorobenzene	1.73	mg/kg	0.010	ND
1,2-Dibromo-3-chloropropane	1.73	mg/kg	0.010	ND
1,2-Dibromoethane	1.73	mg/kg	0.0052	ND
1,2-Dichlorobenzene	1.73	mg/kg	0.010	ND
1,2-Dichloroethane	1.73	mg/kg	0.010	ND
1,2-Dichloropropane	1.73	mg/kg	0.010	ND
1,3-Dichlorobenzene	1.73	mg/kg	0.010	ND
1,4-Dichlorobenzene	1.73	mg/kg	0.010	ND
1,4-Dioxane	1.73	mg/kg	0.52	ND
2-Butanone	1.73	mg/kg	0.010	ND
2-Hexanone	1.73	mg/kg	0.010	ND
4-Methyl-2-pentanone	1.73	mg/kg	0.010	ND
Acetone	1.73	mg/kg	0.052	ND
Benzene	1.73	mg/kg	0.0052	ND
Bromochloromethane	1.73	mg/kg	0.010	ND
Bromodichloromethane	1.73	mg/kg	0.010	ND
Bromoform	1.73	mg/kg	0.010	ND
Bromomethane	1.73	mg/kg	0.010	ND
Carbon disulfide	1.73	mg/kg	0.010	ND
Carbon tetrachloride	1.73	mg/kg	0.010	ND

Sample ID: WCSB08 | **Collection Date: 12/30/2016**
Lab#: AC95422-008 | **Receipt Date: 12/30/2016**
Matrix: Soil/Encore

Chlorobenzene	1.73	mg/kg	0.010	ND	
Chloroethane	1.73	mg/kg	0.010	ND	
Chloroform	1.73	mg/kg	0.010	ND	
Chloromethane	1.73	mg/kg	0.010	ND	
cis-1,2-Dichloroethene	1.73	mg/kg	0.010	ND	
cis-1,3-Dichloropropene	1.73	mg/kg	0.010	ND	
Cyclohexane	1.73	mg/kg	0.010	ND	
Dibromochloromethane	1.73	mg/kg	0.010	ND	
Dichlorodifluoromethane	1.73	mg/kg	0.010	ND	
Ethylbenzene	1.73	mg/kg	0.0052	ND	
Isopropylbenzene	1.73	mg/kg	0.0052	ND	
m&p-Xylenes	1.73	mg/kg	0.0052	ND	
Methyl Acetate	1.73	mg/kg	0.010	ND	
Methylcyclohexane	1.73	mg/kg	0.010	ND	
Methylene chloride	1.73	mg/kg	0.010	ND	
Methyl-t-butyl ether	1.73	mg/kg	0.0052	ND	
o-Xylene	1.73	mg/kg	0.0052	ND	
Styrene	1.73	mg/kg	0.010	ND	
Tetrachloroethene	1.73	mg/kg	0.010	ND	
Toluene	1.73	mg/kg	0.0052	ND	
trans-1,2-Dichloroethene	1.73	mg/kg	0.010	ND	
trans-1,3-Dichloropropene	1.73	mg/kg	0.010	ND	
Trichloroethene	1.73	mg/kg	0.010	ND	
Trichlorofluoromethane	1.73	mg/kg	0.010	ND	
Vinyl chloride	1.73	mg/kg	0.010	ND	
Xylenes (Total)	1.73	mg/kg	0.0052	ND	

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
Toluene-d8	24.10	30	68	122	80	
Dibromofluoromethane	40.09	30	63	140	134	
Bromofluorobenzene	36.13	30	64	129	120	
1,2-Dichloroethane-d4	31.95	30	63	143	107	

Volatile Organics + 15 (8260) Library Searches

Analyte	DF	Units	RT	Result
No Unknown Compounds Detected	1.73	mg/kg	NA	ND
TotalVolatileTic	1.73	mg/kg	NA	ND

Sample ID: WCSB09 | **Collection Date: 12/30/2016**
Lab#: AC95422-009 | **Receipt Date: 12/30/2016**
Matrix: Soil/Encore

% Solids SM2540G

Analyte	DF	Units	RL	Result
% Solids	**1**	**percent**		**16**

Cyanide (Soil/Waste) 9012B

Analyte	DF	Units	RL	Result
Cyanide	1	mg/kg	1.5	ND

Mercury (Soil/Waste) 7471B

Analyte	DF	Units	RL	Result
Mercury	**1**	**mg/kg**	**0.52**	**1.5**

Organochlorine Pesticides 8081

Analyte	DF	Units	RL	Result
a-Chlordane	1	mg/kg	0.031	ND
Aldrin	1	mg/kg	0.031	ND
Alpha-BHC	1	mg/kg	0.0063	ND
beta-BHC	1	mg/kg	0.0063	ND
Chlordane (Total)	1	mg/kg	0.031	ND
delta-BHC	1	mg/kg	0.031	ND
Dieldrin	1	mg/kg	0.0063	ND
Endosulfan I	1	mg/kg	0.031	ND
Endosulfan II	1	mg/kg	0.031	ND
Endosulfan Sulfate	1	mg/kg	0.031	ND
Endrin	1	mg/kg	0.031	ND
Endrin Aldehyde	1	mg/kg	0.031	ND
Endrin Ketone	1	mg/kg	0.031	ND
gamma-BHC	1	mg/kg	0.0063	ND
Heptachlor	1	mg/kg	0.031	ND
Heptachlor Epoxide	1	mg/kg	0.031	ND
Methoxychlor	1	mg/kg	0.031	ND
p,p'-DDD	1	mg/kg	0.016	ND
p,p'-DDE	1	mg/kg	0.016	ND
p,p'-DDT	1	mg/kg	0.016	ND
Toxaphene	1	mg/kg	0.16	ND
y-Chlordane	1	mg/kg	0.031	ND

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
TCMX-Surrogate	102.03	100	37	141	102	
TCMX-Surrogate	103.54	100	37	141	104	
DCB-Surrogate	96.36	100	33	146	96	
DCB-Surrogate	86.04	100	33	146	86	

pH 9040C/9045D

Analyte	DF	Units	RL	Result
pH	**1**	**ph**		**6.9**

Semivolatile Organics + 15 (8270)

Analyte	DF	Units	RL	Result
1,1'-Biphenyl	1	mg/kg	0.21	ND
1,2,4,5-Tetrachlorobenzene	1	mg/kg	0.21	ND
2,3,4,6-Tetrachlorophenol	1	mg/kg	0.21	ND
2,4,5-Trichlorophenol	1	mg/kg	0.21	ND
2,4,6-Trichlorophenol	1	mg/kg	0.21	ND
2,4-Dichlorophenol	1	mg/kg	0.052	ND
2,4-Dimethylphenol	1	mg/kg	0.052	ND
2,4-Dinitrophenol	1	mg/kg	1.0	ND
2,4-Dinitrotoluene	1	mg/kg	0.21	ND
2,6-Dinitrotoluene	1	mg/kg	0.21	ND
2-Chloronaphthalene	1	mg/kg	0.21	ND
2-Chlorophenol	1	mg/kg	0.21	ND
2-Methylnaphthalene	1	mg/kg	0.21	ND
2-Methylphenol	1	mg/kg	0.052	ND
2-Nitroaniline	1	mg/kg	0.21	ND
2-Nitrophenol	1	mg/kg	0.21	ND
3&4-Methylphenol	1	mg/kg	0.052	ND
3,3'-Dichlorobenzidine	1	mg/kg	0.21	ND

3-Nitroaniline	1	mg/kg	0.21	ND
4,6-Dinitro-2-methylphenol	1	mg/kg	1.0	ND
4-Bromophenyl-phenylether	1	mg/kg	0.21	ND
4-Chloro-3-methylphenol	1	mg/kg	0.21	ND
4-Chloroaniline	1	mg/kg	0.052	ND
4-Chlorophenyl-phenylether	1	mg/kg	0.21	ND
4-Nitroaniline	1	mg/kg	0.21	ND
4-Nitrophenol	1	mg/kg	0.21	ND
Acenaphthene	1	mg/kg	0.21	ND
Acenaphthylene	1	mg/kg	0.21	ND
Acetophenone	1	mg/kg	0.21	ND
Anthracene	1	mg/kg	0.21	ND
Atrazine	1	mg/kg	0.21	ND
Benzaldehyde	1	mg/kg	0.21	ND
Benzo[a]anthracene	1	mg/kg	0.21	ND
Benzo[a]pyrene	1	mg/kg	0.21	ND
Benzo[b]fluoranthene	1	mg/kg	0.21	ND
Benzo[g,h,i]perylene	1	mg/kg	0.21	ND
Benzo[k]fluoranthene	1	mg/kg	0.21	ND
bis(2-Chloroethoxy)methane	1	mg/kg	0.21	ND
bis(2-Chloroethyl)ether	1	mg/kg	0.052	ND
bis(2-Chloroisopropyl)ether	1	mg/kg	0.21	ND
bis(2-Ethylhexyl)phthalate	1	mg/kg	0.21	ND
Butylbenzylphthalate	1	mg/kg	0.21	ND
Caprolactam	1	mg/kg	0.21	ND
Carbazole	1	mg/kg	0.21	ND
Chrysene	1	mg/kg	0.21	ND
Dibenzo[a,h]anthracene	1	mg/kg	0.21	ND
Dibenzofuran	1	mg/kg	0.052	ND
Diethylphthalate	1	mg/kg	0.21	ND
Dimethylphthalate	1	mg/kg	0.21	ND
Di-n-butylphthalate	1	mg/kg	0.052	ND
Di-n-octylphthalate	1	mg/kg	0.21	ND
Fluoranthene	1	mg/kg	0.21	ND
Fluorene	1	mg/kg	0.21	ND
Hexachlorobenzene	1	mg/kg	0.21	ND
Hexachlorobutadiene	1	mg/kg	0.21	ND
Hexachlorocyclopentadiene	1	mg/kg	0.49	ND
Hexachloroethane	1	mg/kg	0.21	ND
Indeno[1,2,3-cd]pyrene	1	mg/kg	0.21	ND
Isophorone	1	mg/kg	0.21	ND
Naphthalene	1	mg/kg	0.052	ND
Nitrobenzene	1	mg/kg	0.21	ND
N-Nitroso-di-n-propylamine	1	mg/kg	0.052	ND
N-Nitrosodiphenylamine	1	mg/kg	0.21	ND
Pentachlorophenol	1	mg/kg	1.0	ND
Phenanthrene	1	mg/kg	0.21	ND
Phenol	1	mg/kg	0.21	ND
Pyrene	1	mg/kg	0.21	ND

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
Terphenyl-d14	11.09	50	58	148	22	Sb8
Phenol-d5	26.67	100	49	129	27	Sa8
Nitrobenzene-d5	8.42	50	52	129	17	Sb8
2-Fluorophenol	24.93	100	43	128	25	Sa8
2-Fluorobiphenyl	8.99	50	58	125	18	Sb8
2,4,6-Tribromophenol	24.38	100	54	145	24	Sa8

Semivolatile Organics + 15 (8270) Library Searches

Analyte	DF	Units	RT	Result
(24R)-4-STIGMASTEN-3-ONE	**1**	**mg/kg**	**11.8**	**0.63J**
Nonadecane	**1**	**mg/kg**	**12.73**	**0.64J**
Heptacosane	**1**	**mg/kg**	**13.49**	**0.97J**
Octacosane	**1**	**mg/kg**	**14.21**	**0.95J**
unknown	**1**	**mg/kg**	**14.92**	**0.56J**
unknown	**1**	**mg/kg**	**15**	**0.75J**
Vitamin E	**1**	**mg/kg**	**15.24**	**1.2J**
unknown	**1**	**mg/kg**	**15.93**	**0.63J**
Stigmast-5-en-3-ol, (3.beta.,24S)-	**1**	**mg/kg**	**16.41**	**2.4J**
Junipene	**1**	**mg/kg**	**16.7**	**0.57J**

unknown	**1**	**mg/kg**	**3.71**	**0.72J**
unknown	**1**	**mg/kg**	**4.08**	**5.4JB**
2-Pentanone, 4-hydroxy-4-methyl-	**1**	**mg/kg**	**4.41**	**150JAB**
unknown	**1**	**mg/kg**	**5.07**	**1.2JB**
1-Dodecanamine, N,N-dimethyl-	**1**	**mg/kg**	**8.26**	**0.60J**
TotalSemiVolatileTic	**1**	**mg/kg**	**NA**	**170J**

TAL Metals 6010

Analyte	DF	Units	RL	Result
Aluminum	**1**	**mg/kg**	**1200**	**22000**
Barium	1	mg/kg	62	ND
Calcium	1	mg/kg	6200	ND
Chromium	**1**	**mg/kg**	**31**	**100**
Cobalt	**1**	**mg/kg**	**16**	**75**
Copper	**1**	**mg/kg**	**31**	**110**
Iron	**1**	**mg/kg**	**1200**	**47000**
Lead	**1**	**mg/kg**	**31**	**120**
Magnesium	**1**	**mg/kg**	**3100**	**9600**
Manganese	**1**	**mg/kg**	**62**	**620**
Nickel	**1**	**mg/kg**	**31**	**89**
Potassium	**1**	**mg/kg**	**3100**	**4300**
Sodium	**1**	**mg/kg**	**1600**	**35000**
Vanadium	**1**	**mg/kg**	**62**	**85**
Zinc	**1**	**mg/kg**	**62**	**480**

TAL Metals 6020

Analyte	DF	Units	RL	Result
Antimony	1	mg/kg	5.0	ND
Arsenic	**1**	**mg/kg**	**1.2**	**56**
Beryllium	**1**	**mg/kg**	**1.2**	**3.5**
Cadmium	1	mg/kg	2.5	ND
Selenium	1	mg/kg	13	ND
Silver	1	mg/kg	1.2	ND
Thallium	1	mg/kg	2.5	ND

TOC (Region II/Kahn)

Analyte	DF	Units	RL	Result
Total Organic Carbon	**1**	**mg/kg**	**8100**	**150000**

Volatile Organics + 15 (8260)

Analyte	DF	Units	RL	Result
1,1,1-Trichloroethane	1.73	mg/kg	0.022	ND
1,1,2,2-Tetrachloroethane	1.73	mg/kg	0.022	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	1.73	mg/kg	0.022	ND
1,1,2-Trichloroethane	1.73	mg/kg	0.022	ND
1,1-Dichloroethane	1.73	mg/kg	0.022	ND
1,1-Dichloroethene	1.73	mg/kg	0.022	ND
1,2,3-Trichlorobenzene	1.73	mg/kg	0.022	ND
1,2,4-Trichlorobenzene	1.73	mg/kg	0.022	ND
1,2-Dibromo-3-chloropropane	1.73	mg/kg	0.022	ND
1,2-Dibromoethane	1.73	mg/kg	0.011	ND
1,2-Dichlorobenzene	1.73	mg/kg	0.022	ND
1,2-Dichloroethane	1.73	mg/kg	0.022	ND
1,2-Dichloropropane	1.73	mg/kg	0.022	ND
1,3-Dichlorobenzene	1.73	mg/kg	0.022	ND
1,4-Dichlorobenzene	1.73	mg/kg	0.022	ND
1,4-Dioxane	1.73	mg/kg	1.1	ND
2-Butanone	1.73	mg/kg	0.022	ND
2-Hexanone	1.73	mg/kg	0.022	ND
4-Methyl-2-pentanone	1.73	mg/kg	0.022	ND
Acetone	1.73	mg/kg	0.11	ND
Benzene	1.73	mg/kg	0.011	ND
Bromochloromethane	1.73	mg/kg	0.022	ND
Bromodichloromethane	1.73	mg/kg	0.022	ND
Bromoform	1.73	mg/kg	0.022	ND
Bromomethane	1.73	mg/kg	0.022	ND
Carbon disulfide	1.73	mg/kg	0.022	ND
Carbon tetrachloride	1.73	mg/kg	0.022	ND

Sample ID: WCSB09 **Collection Date: 12/30/2016**
Lab#: AC95422-009 **Receipt Date: 12/30/2016**
Matrix: Soil/Encore

Chlorobenzene	1.73	mg/kg	0.022	ND
Chloroethane	1.73	mg/kg	0.022	ND
Chloroform	1.73	mg/kg	0.022	ND
Chloromethane	1.73	mg/kg	0.022	ND
cis-1,2-Dichloroethene	1.73	mg/kg	0.022	ND
cis-1,3-Dichloropropene	1.73	mg/kg	0.022	ND
Cyclohexane	1.73	mg/kg	0.022	ND
Dibromochloromethane	1.73	mg/kg	0.022	ND
Dichlorodifluoromethane	1.73	mg/kg	0.022	ND
Ethylbenzene	1.73	mg/kg	0.011	ND
Isopropylbenzene	1.73	mg/kg	0.011	ND
m&p-Xylenes	1.73	mg/kg	0.011	ND
Methyl Acetate	1.73	mg/kg	0.022	ND
Methylcyclohexane	1.73	mg/kg	0.022	ND
Methylene chloride	1.73	mg/kg	0.022	ND
Methyl-t-butyl ether	1.73	mg/kg	0.011	ND
o-Xylene	1.73	mg/kg	0.011	ND
Styrene	1.73	mg/kg	0.022	ND
Tetrachloroethene	1.73	mg/kg	0.022	ND
Toluene	1.73	mg/kg	0.011	ND
trans-1,2-Dichloroethene	1.73	mg/kg	0.022	ND
trans-1,3-Dichloropropene	1.73	mg/kg	0.022	ND
Trichloroethene	1.73	mg/kg	0.022	ND
Trichlorofluoromethane	1.73	mg/kg	0.022	ND
Vinyl chloride	1.73	mg/kg	0.022	ND
Xylenes (Total)	1.73	mg/kg	0.011	ND

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
Toluene-d8	25.68	30	68	122	86	
Dibromofluoromethane	38.47	30	63	140	128	
Bromofluorobenzene	34.09	30	64	129	114	
1,2-Dichloroethane-d4	30.89	30	63	143	103	

Volatile Organics + 15 (8260) Library Searches

Analyte	DF	Units	RT	Result
No Unknown Compounds Detected	1.73	mg/kg	NA	ND
TotalVolatileTic	1.73	mg/kg	NA	ND

Sample ID: WCSB10 | **Collection Date: 12/30/2016**
Lab#: AC95422-010 | **Receipt Date: 12/30/2016**
Matrix: Soil/Encore

% Solids SM2540G

Analyte	DF	Units	RL	Result
% Solids	**1**	**percent**		**22**

Cyanide (Soil/Waste) 9012B

Analyte	DF	Units	RL	Result
Cyanide	1	mg/kg	1.1	ND

Mercury (Soil/Waste) 7471B

Analyte	DF	Units	RL	Result
Mercury	**1**	**mg/kg**	**0.38**	**1.6**

Organochlorine Pesticides 8081

Analyte	DF	Units	RL	Result
a-Chlordane	1	mg/kg	0.023	ND
Aldrin	1	mg/kg	0.023	ND
Alpha-BHC	1	mg/kg	0.0045	ND
beta-BHC	1	mg/kg	0.0045	ND
Chlordane (Total)	1	mg/kg	0.023	ND
delta-BHC	1	mg/kg	0.023	ND
Dieldrin	1	mg/kg	0.0045	ND
Endosulfan I	1	mg/kg	0.023	ND
Endosulfan II	1	mg/kg	0.023	ND
Endosulfan Sulfate	1	mg/kg	0.023	ND
Endrin	1	mg/kg	0.023	ND
Endrin Aldehyde	1	mg/kg	0.023	ND
Endrin Ketone	1	mg/kg	0.023	ND
gamma-BHC	1	mg/kg	0.0045	ND
Heptachlor	1	mg/kg	0.023	ND
Heptachlor Epoxide	1	mg/kg	0.023	ND
Methoxychlor	1	mg/kg	0.023	ND
p,p'-DDD	1	mg/kg	0.011	ND
p,p'-DDE	**1**	**mg/kg**	**0.011**	**0.016d**
p,p'-DDT	1	mg/kg	0.011	ND
Toxaphene	1	mg/kg	0.11	ND
y-Chlordane	1	mg/kg	0.023	ND

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
TCMX-Surrogate	105.87	100	37	141	106	
TCMX-Surrogate	108.39	100	37	141	108	
DCB-Surrogate	100.01	100	33	146	100	
DCB-Surrogate	91.17	100	33	146	91	

pH 9040C/9045D

Analyte	DF	Units	RL	Result
pH	**1**	**ph**		**7**

Semivolatile Organics + 15 (8270)

Analyte	DF	Units	RL	Result
1,1'-Biphenyl	1	mg/kg	0.15	ND
1,2,4,5-Tetrachlorobenzene	1	mg/kg	0.15	ND
2,3,4,6-Tetrachlorophenol	1	mg/kg	0.15	ND
2,4,5-Trichlorophenol	1	mg/kg	0.15	ND
2,4,6-Trichlorophenol	1	mg/kg	0.15	ND
2,4-Dichlorophenol	1	mg/kg	0.038	ND
2,4-Dimethylphenol	1	mg/kg	0.038	ND
2,4-Dinitrophenol	1	mg/kg	0.76	ND
2,4-Dinitrotoluene	1	mg/kg	0.15	ND
2,6-Dinitrotoluene	1	mg/kg	0.15	ND
2-Chloronaphthalene	1	mg/kg	0.15	ND
2-Chlorophenol	1	mg/kg	0.15	ND
2-Methylnaphthalene	1	mg/kg	0.15	ND
2-Methylphenol	1	mg/kg	0.038	ND
2-Nitroaniline	1	mg/kg	0.15	ND
2-Nitrophenol	1	mg/kg	0.15	ND
3&4-Methylphenol	1	mg/kg	0.038	ND
3,3'-Dichlorobenzidine	1	mg/kg	0.15	ND

3-Nitroaniline	1	mg/kg	0.15	ND
4,6-Dinitro-2-methylphenol	1	mg/kg	0.76	ND
4-Bromophenyl-phenylether	1	mg/kg	0.15	ND
4-Chloro-3-methylphenol	1	mg/kg	0.15	ND
4-Chloroaniline	1	mg/kg	0.038	ND
4-Chlorophenyl-phenylether	1	mg/kg	0.15	ND
4-Nitroaniline	1	mg/kg	0.15	ND
4-Nitrophenol	1	mg/kg	0.15	ND
Acenaphthene	1	mg/kg	0.15	ND
Acenaphthylene	1	mg/kg	0.15	ND
Acetophenone	1	mg/kg	0.15	ND
Anthracene	1	mg/kg	0.15	ND
Atrazine	1	mg/kg	0.15	ND
Benzaldehyde	1	mg/kg	0.15	ND
Benzo[a]anthracene	1	mg/kg	0.15	ND
Benzo[a]pyrene	1	mg/kg	0.15	ND
Benzo[b]fluoranthene	**1**	**mg/kg**	**0.15**	**0.15**
Benzo[g,h,i]perylene	1	mg/kg	0.15	ND
Benzo[k]fluoranthene	1	mg/kg	0.15	ND
bis(2-Chloroethoxy)methane	1	mg/kg	0.15	ND
bis(2-Chloroethyl)ether	1	mg/kg	0.038	ND
bis(2-Chloroisopropyl)ether	1	mg/kg	0.15	ND
bis(2-Ethylhexyl)phthalate	**1**	**mg/kg**	**0.15**	**0.43**
Butylbenzylphthalate	1	mg/kg	0.15	ND
Caprolactam	1	mg/kg	0.15	ND
Carbazole	1	mg/kg	0.15	ND
Chrysene	1	mg/kg	0.15	ND
Dibenzo[a,h]anthracene	1	mg/kg	0.15	ND
Dibenzofuran	1	mg/kg	0.038	ND
Diethylphthalate	1	mg/kg	0.15	ND
Dimethylphthalate	1	mg/kg	0.15	ND
Di-n-butylphthalate	1	mg/kg	0.038	ND
Di-n-octylphthalate	1	mg/kg	0.15	ND
Fluoranthene	1	mg/kg	0.15	ND
Fluorene	1	mg/kg	0.15	ND
Hexachlorobenzene	1	mg/kg	0.15	ND
Hexachlorobutadiene	1	mg/kg	0.15	ND
Hexachlorocyclopentadiene	1	mg/kg	0.36	ND
Hexachloroethane	1	mg/kg	0.15	ND
Indeno[1,2,3-cd]pyrene	1	mg/kg	0.15	ND
Isophorone	1	mg/kg	0.15	ND
Naphthalene	1	mg/kg	0.038	ND
Nitrobenzene	1	mg/kg	0.15	ND
N-Nitroso-di-n-propylamine	1	mg/kg	0.038	ND
N-Nitrosodiphenylamine	1	mg/kg	0.15	ND
Pentachlorophenol	1	mg/kg	0.76	ND
Phenanthrene	1	mg/kg	0.15	ND
Phenol	1	mg/kg	0.15	ND
Pyrene	1	mg/kg	0.15	ND

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
Terphenyl-d14	19.43	50	58	148	39	Sb8
Phenol-d5	37.48	100	49	129	37	Sa8
Nitrobenzene-d5	13.94	50	52	129	28	Sb8
2-Fluorophenol	34.49	100	43	128	34	Sa8
2-Fluorobiphenyl	14.12	50	58	125	28	Sb8
2,4,6-Tribromophenol	40.92	100	54	145	41	Sa8

Semivolatile Organics + 15 (8270) Library Searches

Analyte	DF	Units	RT	Result
Hexatriacontane	**1**	**mg/kg**	**12.73**	**1.1J**
Eicosane	**1**	**mg/kg**	**13.49**	**1.3J**
Nonacosane	**1**	**mg/kg**	**14.21**	**1.5J**
unknown	**1**	**mg/kg**	**15**	**1.0J**
Vitamin E	**1**	**mg/kg**	**15.24**	**1.7J**
Ergost-5-en-3-ol, (3.beta.)-	**1**	**mg/kg**	**15.92**	**1.2J**
Stigmast-5-en-3-ol, (3.beta.,24S)-	**1**	**mg/kg**	**16.41**	**3.5J**
unknown	**1**	**mg/kg**	**16.46**	**1.5J**
unknown	**1**	**mg/kg**	**16.51**	**1.6J**
1,2-Propanediol	**1**	**mg/kg**	**3.07**	**1.4J**

unknown	**1**	**mg/kg**	**4.08**	**3.7JB**
2-Pentanone, 4-hydroxy-4-methyl-	**1**	**mg/kg**	**4.42**	**96JAB**
unknown	**1**	**mg/kg**	**5.07**	**0.86JB**
unknown	**1**	**mg/kg**	**5.32**	**1.2J**
unknown	**1**	**mg/kg**	**5.97**	**0.90J**
TotalSemiVolatileTic	**1**	**mg/kg**	**NA**	**120J**

TAL Metals 6010

Analyte	DF	Units	RL	Result
Aluminum	**1**	**mg/kg**	**910**	**35000**
Barium	**1**	**mg/kg**	**45**	**100**
Calcium	**1**	**mg/kg**	**4500**	**8000**
Chromium	**1**	**mg/kg**	**23**	**390**
Cobalt	**1**	**mg/kg**	**11**	**40**
Copper	**1**	**mg/kg**	**23**	**250**
Iron	**1**	**mg/kg**	**910**	**79000**
Lead	**1**	**mg/kg**	**23**	**320**
Magnesium	**1**	**mg/kg**	**2300**	**16000**
Manganese	**1**	**mg/kg**	**45**	**420**
Nickel	**1**	**mg/kg**	**23**	**100**
Potassium	**1**	**mg/kg**	**2300**	**7300**
Sodium	**1**	**mg/kg**	**1100**	**56000**
Vanadium	**1**	**mg/kg**	**45**	**140**
Zinc	**1**	**mg/kg**	**45**	**580**

TAL Metals 6020

Analyte	DF	Units	RL	Result
Antimony	1	mg/kg	3.6	ND
Arsenic	**1**	**mg/kg**	**0.91**	**50**
Beryllium	**1**	**mg/kg**	**0.91**	**3.5**
Cadmium	1	mg/kg	1.8	ND
Selenium	**1**	**mg/kg**	**9.1**	**16**
Silver	**1**	**mg/kg**	**0.91**	**2.5**
Thallium	1	mg/kg	1.8	ND

TOC (Region II/Kahn)

Analyte	DF	Units	RL	Result
Total Organic Carbon	**1**	**mg/kg**	**5900**	**140000**

Volatile Organics + 15 (8260)

Analyte	DF	Units	RL	Result
1,1,1-Trichloroethane	1.57	mg/kg	0.014	ND
1,1,2,2-Tetrachloroethane	1.57	mg/kg	0.014	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	1.57	mg/kg	0.014	ND
1,1,2-Trichloroethane	1.57	mg/kg	0.014	ND
1,1-Dichloroethane	1.57	mg/kg	0.014	ND
1,1-Dichloroethene	1.57	mg/kg	0.014	ND
1,2,3-Trichlorobenzene	1.57	mg/kg	0.014	ND
1,2,4-Trichlorobenzene	1.57	mg/kg	0.014	ND
1,2-Dibromo-3-chloropropane	1.57	mg/kg	0.014	ND
1,2-Dibromoethane	1.57	mg/kg	0.0071	ND
1,2-Dichlorobenzene	1.57	mg/kg	0.014	ND
1,2-Dichloroethane	1.57	mg/kg	0.014	ND
1,2-Dichloropropane	1.57	mg/kg	0.014	ND
1,3-Dichlorobenzene	1.57	mg/kg	0.014	ND
1,4-Dichlorobenzene	1.57	mg/kg	0.014	ND
1,4-Dioxane	1.57	mg/kg	0.71	ND
2-Butanone	1.57	mg/kg	0.014	ND
2-Hexanone	1.57	mg/kg	0.014	ND
4-Methyl-2-pentanone	1.57	mg/kg	0.014	ND
Acetone	1.57	mg/kg	0.071	ND
Benzene	1.57	mg/kg	0.0071	ND
Bromochloromethane	1.57	mg/kg	0.014	ND
Bromodichloromethane	1.57	mg/kg	0.014	ND
Bromoform	1.57	mg/kg	0.014	ND
Bromomethane	1.57	mg/kg	0.014	ND
Carbon disulfide	1.57	mg/kg	0.014	ND
Carbon tetrachloride	1.57	mg/kg	0.014	ND

Sample ID: WCSB10 | **Collection Date: 12/30/2016**
Lab#: AC95422-010 | **Receipt Date: 12/30/2016**
Matrix: Soil/Encore

Chlorobenzene	1.57	mg/kg	0.014	ND	
Chloroethane	1.57	mg/kg	0.014	ND	
Chloroform	1.57	mg/kg	0.014	ND	
Chloromethane	1.57	mg/kg	0.014	ND	
cis-1,2-Dichloroethene	1.57	mg/kg	0.014	ND	
cis-1,3-Dichloropropene	1.57	mg/kg	0.014	ND	
Cyclohexane	1.57	mg/kg	0.014	ND	
Dibromochloromethane	1.57	mg/kg	0.014	ND	
Dichlorodifluoromethane	1.57	mg/kg	0.014	ND	
Ethylbenzene	1.57	mg/kg	0.0071	ND	
Isopropylbenzene	1.57	mg/kg	0.0071	ND	
m&p-Xylenes	1.57	mg/kg	0.0071	ND	
Methyl Acetate	1.57	mg/kg	0.014	ND	
Methylcyclohexane	1.57	mg/kg	0.014	ND	
Methylene chloride	1.57	mg/kg	0.014	ND	
Methyl-t-butyl ether	1.57	mg/kg	0.0071	ND	
o-Xylene	1.57	mg/kg	0.0071	ND	
Styrene	1.57	mg/kg	0.014	ND	
Tetrachloroethene	1.57	mg/kg	0.014	ND	
Toluene	1.57	mg/kg	0.0071	ND	
trans-1,2-Dichloroethene	1.57	mg/kg	0.014	ND	
trans-1,3-Dichloropropene	1.57	mg/kg	0.014	ND	
Trichloroethene	1.57	mg/kg	0.014	ND	
Trichlorofluoromethane	1.57	mg/kg	0.014	ND	
Vinyl chloride	1.57	mg/kg	0.014	ND	
Xylenes (Total)	1.57	mg/kg	0.0071	ND	

Surrogate	Conc.	Spike	Low Limit	High Limit	Recovery	Flags
Toluene-d8	24.14	30	68	122	80	
Dibromofluoromethane	36.14	30	63	140	120	
Bromofluorobenzene	33.03	30	64	129	110	
1,2-Dichloroethane-d4	31.97	30	63	143	107	

Volatile Organics + 15 (8260) Library Searches

Analyte	DF	Units	RT	Result
Methane, thiobis-	**1.57**	**mg/kg**	**2.78**	**6.1J**
TotalVolatileTic	**1.57**	**mg/kg**	**NA**	**6.1J**

HamptonClarke-Veritech Laboratories
175 Route 46 West and 2 Madison Road, Fairfield, New Jersey 07004
Ph: 800-426-9992 | 973-244-9770 Fax: 973-244-9787 | 973-439-1458
Service Center: 137-D Gaither Drive, Mount Laurel, New Jersey 08054
Ph (Service Center): 856-780-6057 Fax: 856-780-6056
A Women-Owned, Disadvantaged, Small Business Enterprise
NELAC/NJ #07071 | PA #68-00463 | NY #11408 | CT #PH-0671 | KY #90124

CHAIN OF CUSTODY RECORD

Project# (Lab Use Only): 6123013

3) Reporting Requirements (Please Circle)

Turnaround	Report Type	Electronic Deliv.
Standard	NJ Reduced	Excel & PDF

Expedited TAT Not Always Available. Please Check with Lab.

Customer Information

1a) Customer: HDR
Address: 1 International Blvd Floor 10
Mahwah, NJ 07495
1b) Email/Cell/Fax/Ph: 201.335.9341
1c) Send Invoice to: Dave Brizzolara
1d) Send Report to: Dave Brizzolara

Project Information

2a) Project: Evergreen-Whale Creek
2b) Project Mgr: Dave Bizzolara
2c) Project Location (City/State): Old Bridge NJ
2d) Quote/PO # (If Applicable): 10038062

FOR LAB USE ONLY ↓
Batch # Ac95422

Check If Contingent ===>

Matrix Codes
DW - Drinking Water S - Soil A - Air
GW - Ground Water SL - Sludge
WW - Waste Water OL - Oil
OT - Other (please specify under item 9, Comments)

7) Analysis Request

<=== Check If Contingent

Lab Sample #	4) Customer Sample ID	5) Matrix	6) Sample Date	6) Sample Time	Preservative	Composite (C)	Grab (G)	VOCs/%Mois	PCB/Cong	BNA/Pest/TAL Metals/TOC/pH/C N/Hg	Grain Size	Dioxins/Furans	8) # of Bottles	Other:	9) Comments
								NONE	NONE	NONE	NONE	NONE			
001	WCSB01	Sed	12/30/16	12:00		X		2	1	1	1	1			
002	WCSB02	Sed	12/30/16	12:12		X		2	1	1	1	1			
003	WCSB03	Sed	12/30/16	12:33		X		2	1	1	1	1			
004	WCSB04	Sed	12/30/16	11:00		X		2	1	1	1	1			
005	WCSB05	Sed	12/30/16	10:30		X		2	1	1	1	1			
006	WCSB06	Sed	12/30/16	10:15		X		2	1	1	1	1			
007	WCSB07	Sed	12/30/16	11:30		X		2	1	1	1	1			
008	WCSB08	Sed	12/30/16	11:30		X		2	1	1	1	1			
009	WCSB09	Sed	12/30/16	11:45		X		2	1	1	1	1			
010	WCSB10	Sed	12/30/16	2:05		X		2	1	1	1	1			

10) Relinquished by:	Accepted by:	Date	Time
		12/30/16	16:05

Additional Notes
Bottle order list PCBs with 16 oz Jar. The analysis is not needed as a separate jar for PCBs/Congeners is being submitted in an 8oz jar.

Comments, Notes, Special Requirements, HAZARDS

Note: Check if low-level groundwater methods required to meet current standards in NJ or PA:
- ☐ BN or BNA (8270C SIM)
- ☐ VOC (8260B SIM or 8011)
- ☐ Metals (ICP-MS 200.8 or 6020)
- ☐ Metals-**Soil** (ICP-MS 6020 for Be & Ag)

Note: Check if applicable:
- ☐ **Project-Specific Reporting Limits**
- ☐ **High Contaminant Concentrations**
- ☐ **NJ LSRP Project**

Cooler Temperature: 3.1 2.9 3.8

11) Sampler (print name): Date:

Please note NUMBERED items. If not completed your analytical work may be delayed.
A fee of $5/sample will be assessed for storage should sample not be activated for any analysis.

PCB Congener Analysis

Table A.1
Statistics of Site-wide Sediment Samples for Target Analytes
Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Constituent Group	Constituent	CASRN	Units	Sample Count	Detect Count	Detection Frequency (%)	Minimum Detected Concentration	Qual	Maximum Detected Concentration	Qual	Location of Maximum Detected Concentration	Arithmetic Detected Mean	Range of Detection Limits	95% UCL	95% UCL Method	ProUCL Notes
VOC	1,1,1-Trichloroethane	71-55-6	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	1,1,2,2-Tetrachloroethane	79-34-5	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	1,1,2-Trichloroethane	79-00-5	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	1,1-Dichloroethane	75-34-3	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	1,1-Dichloroethene	75-35-4	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	1,2,3-Trichlorobenzene	87-61-6	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	1,2,4-Trichlorobenzene	120-82-1	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	1,2-Dibromo-3-chloropropane	96-12-8	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	1,2-Dibromoethane	106-93-4	mg/kg	12	0	0	ND		ND		ND	ND	0.0039 - 0.011	--	All non-detect concentrations.	--
VOC	1,2-Dichlorobenzene	95-50-1	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	1,2-Dichloroethane	107-06-2	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	1,2-Dichloropropane	78-87-5	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	1,3-Dichlorobenzene	541-73-1	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	1,4-Dichlorobenzene	106-46-7	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	1,4-Dioxane	123-91-1	mg/kg	12	0	0	ND		ND		ND	ND	0.39 - 1.1	--	All non-detect concentrations.	--
VOC	2-Hexanone	591-78-6	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	Acetone	67-64-1	mg/kg	12	0	0	ND		ND		ND	ND	0.039 - 0.11	--	All non-detect concentrations.	--
VOC	Benzene	71-43-2	mg/kg	12	0	0	ND		ND		ND	ND	0.0039 - 0.011	--	All non-detect concentrations.	--
VOC	Bromochloromethane	74-97-5	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	Bromodichloromethane	75-27-4	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	Bromoform	75-25-2	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	Bromomethane	74-83-9	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	Carbon tetrachloride	56-23-5	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	Chlorobenzene	108-90-7	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	Chloroethane	75-00-3	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	Chloroform	67-66-3	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	Chloromethane	74-87-3	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	cis-1,2-Dichloroethylene	156-59-2	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	cis-1,3-Dichloropropene	10061-01-5	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	Cyclohexane	110-82-7	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	Dibromochloromethane	124-48-1	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	Dichlorodifluoromethane	75-71-8	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	Ethylbenzene	100-41-4	mg/kg	12	0	0	ND		ND		ND	ND	0.0039 - 0.011	--	All non-detect concentrations.	--
VOC	Isopropylbenzene (Cumene)	98-82-8	mg/kg	12	0	0	ND		ND		ND	ND	0.0039 - 0.011	--	All non-detect concentrations.	--
VOC	m,p-Xylene	179601-23-1	mg/kg	12	0	0	ND		ND		ND	ND	0.0039 - 0.011	--	All non-detect concentrations.	--
VOC	Methyl acetate	79-20-9	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	Methyl Ethyl Ketone (2-butanone)	78-93-3	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	Methyl Isobutyl Ketone	108-10-1	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	Methyl tert-butyl ether	1634-04-4	mg/kg	12	0	0	ND		ND		ND	ND	0.0039 - 0.011	--	All non-detect concentrations.	--
VOC	Methylcyclohexane	108-87-2	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	Methylene chloride	75-09-2	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	o-Xylene	95-47-6	mg/kg	12	0	0	ND		ND		ND	ND	0.0039 - 0.011	--	All non-detect concentrations.	--
VOC	Styrene	100-42-5	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	Tetrachloroethylene	127-18-4	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	Toluene	108-88-3	mg/kg	12	0	0	ND		ND		ND	ND	0.0039 - 0.011	--	All non-detect concentrations.	--
VOC	trans-1,2-Dichloroethylene	156-60-5	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	trans-1,3-Dichloropropene	10061-02-6	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	Trichloroethylene	79-01-6	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	Trichlorofluoromethane	75-69-4	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	Vinyl chloride	75-01-4	mg/kg	12	0	0	ND		ND		ND	ND	0.0078 - 0.022	--	All non-detect concentrations.	--
VOC	Xylenes (Total)	1330-20-7	mg/kg	12	0	0	ND		ND		ND	ND	0.0039 - 0.011	--	All non-detect concentrations.	--
SVOC	1,2,4,5-Tetrachlorobenzene	95-94-3	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	2,3,4,6-Tetrachlorophenol	58-90-2	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	2,4,5-Trichlorophenol	95-95-4	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	2,4,6-Trichlorophenol	88-06-2	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	2,4-Dichlorophenol	120-83-2	mg/kg	12	0	0	ND		ND		ND	ND	0.02 - 0.076	--	All non-detect concentrations.	--
SVOC	2,4-Dimethylphenol	105-67-9	mg/kg	12	0	0	ND		ND		ND	ND	0.02 - 0.076	--	All non-detect concentrations.	--

Table A.1
Statistics of Site-wide Sediment Samples for Target Analytes
Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Constituent Group	Constituent	CASRN	Units	Sample Count	Detect Count	Detection Frequency (%)	Minimum Detected Concentration	Qual	Maximum Detected Concentration	Qual	Location of Maximum Detected Concentration	Arithmetic Detected Mean	Range of Detection Limits	95% UCL	95% UCL Method	ProUCL Notes
SVOC	2,4-Dinitrophenol	51-28-5	mg/kg	12	0	0	ND		ND		ND	ND	0.4 - 1.5	--	All non-detect concentrations.	--
SVOC	2,4-Dinitrotoluene	121-14-2	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	2,6-Dinitrotoluene	606-20-2	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	2-Chloronaphthalene	91-58-7	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	2-Chlorophenol	95-57-8	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	2-Methylnaphthalene	91-57-6	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	2-Methylphenol	95-48-7	mg/kg	12	0	0	ND		ND		ND	ND	0.02 - 0.076	--	All non-detect concentrations.	--
SVOC	2-Nitroaniline	88-74-4	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	2-Nitrophenol	88-75-5	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	3,3-Dichlorobenzidine	91-94-1	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	3-Nitroaniline	99-09-2	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	4,6-Dinitro-2-methylphenol	534-52-1	mg/kg	12	0	0	ND		ND		ND	ND	0.4 - 1.5	--	All non-detect concentrations.	--
SVOC	4-Bromophenyl-phenylether	101-55-3	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	4-Chloro-3-methylphenol	59-50-7	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	4-Chloroaniline	106-47-8	mg/kg	12	0	0	ND		ND		ND	ND	0.02 - 0.076	--	All non-detect concentrations.	--
SVOC	4-Chlorophenyl-phenylether	7005-72-3	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	4-Methylphenol (p-Cresol)	106-44-5	mg/kg	12	0	0	ND		ND		ND	ND	0.02 - 0.076	--	All non-detect concentrations.	--
SVOC	4-Nitroaniline	100-01-6	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	4-Nitrophenol	100-02-7	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	Acenaphthene	83-32-9	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	Acenaphthylene	208-96-8	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	Acetophenone	98-86-2	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	Anthracene	120-12-7	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	Atrazine	1912-24-9	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	Benzaldehyde	100-52-7	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	Benzo(a)anthracene	56-55-3	mg/kg	12	3	25	0.14		0.22		B2 (D)	0.18	0.079 - 0.3	0.177	95% KM (t) UCL	e
SVOC	Benzo(a)pyrene	50-32-8	mg/kg	12	3	25	0.17		0.27		B2 (D)	0.22	0.079 - 0.3	0.181	95% KM (t) UCL	e
SVOC	Benzo(b)fluoranthene	205-99-2	mg/kg	12	6	50	0.15		0.35		B2 (D)	0.27	0.079 - 0.3	0.26	95% KM (t) UCL	--
SVOC	Benzo(g,h,i)perylene	191-24-2	mg/kg	12	3	25	0.19		0.24		B2 (D)	0.22	0.079 - 0.3	0.186	95% KM (t) UCL	e
SVOC	Benzo(k)fluoranthene	207-08-9	mg/kg	12	1	8	0.13		0.13		WCSB06	0.13	0.079 - 0.3	--	ProUCL did not calculate UCL; insufficient detects	c, f
SVOC	Benzyl Butyl Phthalate	85-68-7	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	Biphenyl (diphenyl)	92-52-4	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	Bis(2-chloroethoxy) Methane	111-91-1	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	Bis(2-chloroethyl)ether	111-44-4	mg/kg	12	0	0	ND		ND		ND	ND	0.02 - 0.076	--	All non-detect concentrations.	--
SVOC	Bis(2-chloroisopropyl)ether	108-60-1	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	Bis(2-ethylhexyl)phthalate	117-81-7	mg/kg	12	6	50	0.2		0.57		WCSB05	0.37	0.079 - 0.3	0.336	95% KM (t) UCL	--
SVOC	Caprolactam	105-60-2	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	Carbazole	86-74-8	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	Chrysene	218-01-9	mg/kg	12	3	25	0.21		0.3		B2 (D)	0.25	0.079 - 0.3	0.181	95% KM (t) UCL	e
SVOC	Dibenz(a,h)anthracene	53-70-3	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	Diethyl phthalate	84-66-2	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	Dimethylphthalate	131-11-3	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	Di-n-butyl phthalate	84-74-2	mg/kg	12	0	0	ND		ND		ND	ND	0.02 - 0.076	--	All non-detect concentrations.	--
SVOC	Di-n-octylphthalate	117-84-0	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	Fluoranthene	206-44-0	mg/kg	12	3	25	0.31		0.35		B2 (D)	0.33	0.079 - 0.3	0.211	95% KM (t) UCL	e
SVOC	Fluorene	86-73-7	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	Hexachlorobenzene	118-74-1	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	Hexachlorobutadiene	87-68-3	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	Hexachlorocyclopentadiene	77-47-4	mg/kg	12	0	0	ND		ND		ND	ND	0.16 - 0.71	--	All non-detect concentrations.	--
SVOC	Hexachloroethane	67-72-1	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	Indeno (1,2,3-cd)pyrene	193-39-5	mg/kg	12	3	25	0.12		0.18		WCSB06	0.16	0.079 - 0.3	0.163	95% KM (t) UCL	e
SVOC	Isophorone	78-59-1	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	Naphthalene	91-20-3	mg/kg	12	1	8	0.065		0.065		B2 (D)	0.065	0.02 - 0.076	--	ProUCL did not calculate UCL; insufficient detects	c, f
SVOC	Nitrobenzene	98-95-3	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	N-Nitrosodi-n-propylamine	621-64-7	mg/kg	12	0	0	ND		ND		ND	ND	0.02 - 0.076	--	All non-detect concentrations.	--
SVOC	N-Nitrosodiphenylamine	86-30-6	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--
SVOC	Pentachlorophenol	87-86-5	mg/kg	12	0	0	ND		ND		ND	ND	0.4 - 1.5	--	All non-detect concentrations.	--
SVOC	Phenanthrene	85-01-8	mg/kg	12	2	17	0.17		0.22		B2 (D)	0.20	0.079 - 0.3	0.157	95% KM (t) UCL	a, b, d, j
SVOC	Phenol	108-95-2	mg/kg	12	0	0	ND		ND		ND	ND	0.079 - 0.3	--	All non-detect concentrations.	--

Table A.1
Statistics of Site-wide Sediment Samples for Target Analytes
Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Constituent Group	Constituent	CASRN	Units	Sample Count	Detect Count	Detection Frequency (%)	Minimum Detected Concentration	Qual	Maximum Detected Concentration	Qual	Location of Maximum Detected Concentration	Arithmetic Detected Mean	Range of Detection Limits	95% UCL	95% UCL Method	ProUCL Notes
SVOC	Pyrene	129-00-0	mg/kg	12	3	25	0.28		0.59		B2 (D)	0.39	0.079 - 0.3	0.256	95% KM (t) UCL	e
PEST	4,4'-DDD	72-54-8	mg/kg	12	4	33	0.0075		0.14		WCSB05	0.064	0.006 - 0.078	0.0515	95% KM (t) UCL	--
PEST	4,4'-DDE	72-55-9	mg/kg	12	5	42	0.0067	D	0.092		WCSB05	0.045	0.006 - 0.078	0.0383	95% KM (t) UCL	--
PEST	4,4'-DDT	50-29-3	mg/kg	12	2	17	0.056		0.17		WCSB05	0.11	0.006 - 0.078	0.106	95% KM (Chebyshev) UCL	d
PEST	Aldrin	309-00-2	mg/kg	12	0	0	ND		ND		ND	ND	0.012 - 0.16	--	All non-detect concentrations.	--
PEST	alpha-Endosulfan (Endosulfan I)	959-98-8	mg/kg	12	0	0	ND		ND		ND	ND	0.012 - 0.16	--	All non-detect concentrations.	--
PEST	beta-Endosulfan (Endosulfan II)	33213-65-9	mg/kg	12	0	0	ND		ND		ND	ND	0.012 - 0.16	--	All non-detect concentrations.	--
PEST	BHC alpha	319-84-6	mg/kg	12	0	0	ND		ND		ND	ND	0.0024 - 0.031	--	All non-detect concentrations.	--
PEST	BHC beta	319-85-7	mg/kg	12	0	0	ND		ND		ND	ND	0.0024 - 0.031	--	All non-detect concentrations.	--
PEST	BHC delta	319-86-8	mg/kg	12	0	0	ND		ND		ND	ND	0.012 - 0.16	--	All non-detect concentrations.	--
PEST	BHC gamma (Lindane)	58-89-9	mg/kg	12	0	0	ND		ND		ND	ND	0.0024 - 0.031	--	All non-detect concentrations.	--
PEST	Chlordane	57-74-9	mg/kg	12	2	17	0.03		0.053		WCSB02	0.042	0.012 - 0.16	0.0282	95% KM (t) UCL	b, d
PEST	Chlordane, alpha	5103-71-9	mg/kg	12	2	17	0.03		0.053		WCSB02	0.042	0.012 - 0.16	0.0282	95% KM (t) UCL	a, b, d, j
PEST	Chlordane, beta	5103-74-2	mg/kg	12	0	0	ND		ND		ND	ND	0.012 - 0.16	--	All non-detect concentrations.	--
PEST	Dibenzofuran	132-64-9	mg/kg	12	0	0	ND		ND		ND	ND	0.02 - 0.076	--	All non-detect concentrations.	--
PEST	Dieldrin	60-57-1	mg/kg	12	1	8	0.0077	D	0.0077	D	B2 (D)	0.0077	0.0024 - 0.031	--	ProUCL did not calculate UCL; insufficient detects	c, f
PEST	Endosulfan sulfate	1031-07-8	mg/kg	12	0	0	ND		ND		ND	ND	0.012 - 0.16	--	All non-detect concentrations.	--
PEST	Endrin	72-20-8	mg/kg	12	0	0	ND		ND		ND	ND	0.012 - 0.16	--	All non-detect concentrations.	--
PEST	Endrin Aldehyde	7421-93-4	mg/kg	12	0	0	ND		ND		ND	ND	0.012 - 0.16	--	All non-detect concentrations.	--
PEST	Endrin Ketone	53494-70-5	mg/kg	12	0	0	ND		ND		ND	ND	0.012 - 0.16	--	All non-detect concentrations.	--
PEST	Heptachlor	76-44-8	mg/kg	12	0	0	ND		ND		ND	ND	0.012 - 0.16	--	All non-detect concentrations.	--
PEST	Heptachlor epoxide	1024-57-3	mg/kg	12	0	0	ND		ND		ND	ND	0.012 - 0.16	--	All non-detect concentrations.	--
PEST	Methoxychlor	72-43-5	mg/kg	12	0	0	ND		ND		ND	ND	0.012 - 0.16	--	All non-detect concentrations.	--
PEST	Toxaphene	8001-35-2	mg/kg	12	0	0	ND		ND		ND	ND	0.06 - 0.78	--	All non-detect concentrations.	--
PCB	PCB-1016 (Aroclor 1016)	12674-11-2	mg/kg	2	0	0	ND		ND		ND	ND	0.06 - 0.11	--	All non-detect concentrations.	--
PCB	PCB-1221 (Aroclor 1221)	11104-28-2	mg/kg	2	0	0	ND		ND		ND	ND	0.06 - 0.11	--	All non-detect concentrations.	--
PCB	PCB-1232 (Aroclor 1232)	11141-16-5	mg/kg	2	0	0	ND		ND		ND	ND	0.06 - 0.11	--	All non-detect concentrations.	--
PCB	PCB-1242 (Aroclor 1242)	53469-21-9	mg/kg	2	0	0	ND		ND		ND	ND	0.06 - 0.11	--	All non-detect concentrations.	--
PCB	PCB-1248 (Aroclor 1248)	12672-29-6	mg/kg	2	0	0	ND		ND		ND	ND	0.06 - 0.11	--	All non-detect concentrations.	--
PCB	PCB-1254 (Aroclor 1254)	11097-69-1	mg/kg	2	1	50	0.098		0.098		B12	0.098	0.06 - 0.11		ProUCL did not calculate UCL; insufficient detects	c, f
PCB	PCB-1260 (Aroclor 1260)	11096-82-5	mg/kg	2	0	0	ND		ND		ND	ND	0.06 - 0.11	--	All non-detect concentrations.	--
PCB	PCB-1262 (Aroclor 1262)	37324-23-5	mg/kg	2	0	0	ND		ND		ND	ND	0.06 - 0.11	--	All non-detect concentrations.	--
PCB	PCB-1268 (Aroclor 1268)	11100-14-4	mg/kg	2	0	0	ND		ND		ND	ND	0.06 - 0.11	--	All non-detect concentrations.	--
PCB	Polychlorinated biphenyls PCBs	1336-36-3	mg/kg	2	1	50	0.098		0.098		B12	0.098	0.06 - 0.11		ProUCL did not calculate UCL; insufficient detects	c, f
OTHER	Carbon disulfide	75-15-0	mg/kg	12	1	8	0.024		0.024		B2 (D)	0.024	0.0078 - 0.022	--	ProUCL did not calculate UCL; insufficient detects	c, f
INORGANIC	Aluminum	7429-90-5	mg/kg	24	24	100	6700		73000		WCSB03	29779	280 - 1700	34799	95% Student's-t UCL	--
INORGANIC	Antimony	7440-36-0	mg/kg	24	2	8	7.7		18		WCSB08	13	1.1 - 6.7	6.573	95% KM (Chebyshev) UCL	d
INORGANIC	Arsenic	7440-38-2	mg/kg	24	24	100	1.1		110		B5	46	0.28 - 1.7	55.11	95% Student's-t UCL	--
INORGANIC	Barium	7440-39-3	mg/kg	24	13	54	21		1200		WCSB05	160	14 - 83	313.8	95% KM (Chebyshev) UCL	--
INORGANIC	Beryllium	7440-41-7	mg/kg	24	22	92	0.98		19		WCSB08	4.1	0.28 - 3.1	5.674	95% KM Adjusted Gamma UCL	--
INORGANIC	Cadmium	7440-43-9	mg/kg	24	2	8	2.9		20		WCSB08	11	0.56 - 3.3	6.379	95% KM (Chebyshev) UCL	d
INORGANIC	Calcium	7440-70-2	mg/kg	24	16	67	2800		14000		B10	6731	1400 - 8300	6688	95% KM (t) UCL	--
INORGANIC	Chromium (Total)	7440-47-3	mg/kg	24	24	100	52		1400		B4 (D)	228	7 - 42	322.7	95% Adjusted Gamma UCL	--
INORGANIC	Cobalt	7440-48-4	mg/kg	24	23	96	12		200		WCSB03	48	3.5 - 21	68.74	95% KM Adjusted Gamma UCL	--
INORGANIC	Copper	7440-50-8	mg/kg	24	24	100	62		320		WCSB05	150	7 - 42	173.1	95% Student's-t UCL	--
INORGANIC	Cyanide	57-12-5	mg/kg	12	1	8	2.3		2.3		WCSB03	2.3	0.57 - 1.6	--	ProUCL did not calculate UCL; insufficient detects	c, f
INORGANIC	Iron	7439-89-6	mg/kg	24	24	100	28000		150000		WCSB06	65667	280 - 1700	75793	95% Student's-t UCL	--
INORGANIC	Lead	7439-92-1	mg/kg	24	24	100	76		3500		WCSB05	331	7 - 42	388.4	95% H-UCL	--
INORGANIC	Magnesium	7439-95-4	mg/kg	24	24	100	2200		16000		WCSB10	10179	700 - 4200	11224	95% Student's-t UCL	--
INORGANIC	Manganese	7439-96-5	mg/kg	24	24	100	99		11000		WCSB03	1397	14 - 83	3632	95% Chebyshev (Mean, Sd) UCL	--
INORGANIC	Mercury	7439-97-6	mg/kg	24	20	83	0.26		2.6		WCSB07	1.4	0.12 - 0.69	1.477	95% KM (t) UCL	--

Table A.1
Statistics of Site-wide Sediment Samples for Target Analytes
Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Constituent Group	Constituent	CASRN	Units	Sample Count	Detect Count	Detection Frequency (%)	Minimum Detected Concentration	Qual	Maximum Detected Concentration	Qual	Location of Maximum Detected Concentration	Arithmetic Detected Mean	Range of Detection Limits	95% UCL	95% UCL Method	ProUCL Notes
INORGANIC	Nickel	7440-02-0	mg/kg	24	24	100	9		240		WCSB03	73	7 - 42	91.71	95% Adjusted Gamma UCL	--
INORGANIC	Potassium	7440-09-7	mg/kg	24	22	92	860		7300		WCSB10	4494	700 - 4200	4766	95% KM (t) UCL	--
INORGANIC	Selenium	7782-49-2	mg/kg	24	16	67	7.1		26		B5	14	2.8 - 17	13.75	95% KM (t) UCL	--
INORGANIC	Silver	7440-22-4	mg/kg	24	11	46	0.31		4.4		B5	1.7	0.28 - 1.7	1.388	95% KM (t) UCL	--
INORGANIC	Sodium	7440-23-5	mg/kg	24	24	100	2000		67000		B5	32192	350 - 2100	38016	95% Student's-t UCL	--
INORGANIC	Thallium	7440-28-0	mg/kg	24	1	4	18		18		WCSB08	18	0.56 - 3.3	--	ProUCL did not calculate UCL; insufficient detects	c, f
INORGANIC	Vanadium	7440-62-2	mg/kg	24	21	88	53		190		WCSB05	100	14 - 83	108.6	95% KM (t) UCL	--
INORGANIC	Zinc	7440-66-6	mg/kg	24	24	100	80		1300		WCSB03	467	14 - 83	561.5	95% Student's-t UCL	--

Notes:
The most appropriate UCL is chosen from the list of ProUCL suggested UCLs based on the distribution of the dataset per ProUCL User Guide. When more than one UCL is suggested, the lowest is chosen.

Abbreviations:
Qual -- Qualifier
mg/kg -- milligrams per kilogram
NA -- Not applicable
ND -- Not detected

ProUCL Notes and Warnings:

a	The lowest UCL is chosen when ProUCL suggested more than one UCL.
b	One or more recommended UCL not available.
c	Data set has only 1 Detected Values.
d	Data set has only 2 Detected Values.
e	Data set has only 3 Detected Values.
f	The data set was not processed.
j	The H-UCL was not chosen because it is presented in ProUCL for historical and research purposes only.

References:
USEPA. 2016. ProUCL Version 5.1.02. September 19. Available online: https://www.epa.gov/land-research/proucl-software
USEPA. 2015. ProUCL Version 5.1 User Guide. EPA/600/R-07/041. October. Available online: https://www.epa.gov/land-research/proucl-version-5100-documentation-downloads

Table A.2
Statistics of Site-wide Sediment Samples for Dioxins
Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Constituent Group	Constituent	CASRN	Units	Sample Count	Detect Count	Detection Frequency (%)	Minimum Detected Concentration	Qual	Maximum Detected Concentration	Qual	Location of Maximum Detected Concentration	Arithmetic Detected Mean	Range of Detection Limits	95% UCL	95% UCL Method	ProUCL Notes
DIOXIN	1,2,3,4,6,7,8,9-Octachlorodibenzofuran	39001-02-0	ng/kg	16	15	94	37		1100		WCSB05	197	10 - 40	474.2	95% KM (Chebyshev) UCL	--
DIOXIN	1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	3268-87-9	ng/kg	16	16	100	1400		22000	E	WCSB05	8463	10 - 40	10897	95% Student's-t UCL	--
DIOXIN	1,2,3,4,6,7,8-Heptachlorodibenzofuran	67562-39-4	ng/kg	16	15	94	26		2400		WCSB05	239	5 - 20	861.6	95% KM (Chebyshev) UCL	--
DIOXIN	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	35822-46-9	ng/kg	16	16	100	60		1800		WCSB05	375	5 - 20	595.1	95% Adjusted Gamma UCL	--
DIOXIN	1,2,3,4,7,8,9-Heptachlorodibenzofuran	55673-89-7	ng/kg	16	2	13	12		37		WCSB05	25	6 - 20	21.25	95% KM (Chebyshev) UCL	d
DIOXIN	1,2,3,4,7,8-Hexachlorodibenzofuran	70648-26-9	ng/kg	16	5	31	9.6		58		WCSB05	25	7.9 - 20	20.76	95% KM (t) UCL	--
DIOXIN	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	39227-28-6	ng/kg	16	2	13	11		12		WCSB05	12	6 - 20	9.913	95% KM (t) UCL	a, b, d, j
DIOXIN	1,2,3,6,7,8-Hexachlorodibenzofuran	57117-44-9	ng/kg	16	3	19	10		31		WCSB05	18	7.7 - 20	13.65	95% KM (t) UCL	e
DIOXIN	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	57653-85-7	ng/kg	16	10	63	9		54		WCSB05	24	7.9 - 20	26.41	95% KM Adjusted Gamma UCL	--
DIOXIN	1,2,3,7,8,9-Hexachlorodibenzofuran	72918-21-9	ng/kg	16	1	6	17		17		WCSB05	17	6 - 20	--	ProUCL did not calculate UCL; insufficient detects	c, f
DIOXIN	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	19408-74-3	ng/kg	16	8	50	6		28		WCSB10	19	7.9 - 20	17.71	95% KM (t) UCL	--
DIOXIN	1,2,3,7,8-Pentachlorodibenzofuran	57117-41-6	ng/kg	16	1	6	16	EMPCP	16	EMPCP	WCSB05	16	6 - 20	--	ProUCL did not calculate UCL; insufficient detects	c, f
DIOXIN	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	40321-76-4	ng/kg	16	1	6	10		10		WCSB05	10	6 - 20	--	ProUCL did not calculate UCL; insufficient detects	c, f
DIOXIN	2,3,4,6,7,8-Hexachlorodibenzofuran	60851-34-5	ng/kg	16	3	19	8.5		42		WCSB05	22	7.7 - 20	15.32	95% KM (t) UCL	e
DIOXIN	2,3,4,7,8-Pentachlorodibenzofuran	57117-31-4	ng/kg	16	3	19	12		59		WCSB05	31	7.7 - 20	19.29	95% KM (t) UCL	e
DIOXIN	2,3,7,8-Tetrachlorodibenzofuran	51207-31-9	ng/kg	16	15	94	4.3		30		WCSB05	11	3.5 - 3.5	15	95% KM Adjusted Gamma UCL	--
DIOXIN	2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6	ng/kg	16	5	31	2.8		4.4		WCSB08	3.68	1.2 - 4	2.887	95% KM (t) UCL	--

Notes:
The most appropriate UCL is chosen from the list of ProUCL suggested UCLs based on the distribution of the dataset per ProUCL User Guide. When more than one UCL is suggested, the lowest is chosen.

Abbreviations:
Qual -- Qualifier
NA -- Not applicable
ng/kg -- nanograms per kilogram
UCL -- Upper confidence limit

ProUCL Notes and Warnings:

a The lowest UCL is chosen when ProUCL suggested more than one UCL.
b One or more recommended UCL not available.
c Data set has only 1 Detected Values.
d Data set has only 2 Detected Values.
e Data set has only 3 Detected Values.
f The data set was not processed.
j The H-UCL was not chosen because it is presented in ProUCL for historical and research purposes only.

References:

USEPA. 2016. ProUCL Version 5.1.02. September 19. Available online: https://www.epa.gov/land-research/proucl-software
USEPA. 2015. ProUCL Version 5.1 User Guide. EPA/600/R-07/041. October. Available online: https://www.epa.gov/land-research/proucl-version-5100-documentation-downloads

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.11/27/2017 1:39:51 PM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

result (4,4'-ddd)

General Statistics

Total Number of Observations	12	Number of Distinct Observations	10
Number of Detects	4	Number of Non-Detects	8
Number of Distinct Detects	4	Number of Distinct Non-Detects	6
Minimum Detect	0.0075	Minimum Non-Detect	0.006
Maximum Detect	0.14	Maximum Non-Detect	0.017
Variance Detects	0.00445	Percent Non-Detects	66.67%
Mean Detects	0.064	SD Detects	0.0667
Median Detects	0.0542	CV Detects	1.043
Skewness Detects	0.302	Kurtosis Detects	-4.283
Mean of Logged Detects	-3.485	SD of Logged Detects	1.567

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.848	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.298	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.375	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0258	KM Standard Error of Mean	0.0143
KM SD	0.0429	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0515	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0494	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0687	95% KM Chebyshev UCL	0.0882
97.5% KM Chebyshev UCL	0.115	99% KM Chebyshev UCL	0.168

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.543	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.669	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.333	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.404	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.806	k star (bias corrected MLE)	0.368
Theta hat (MLE)	0.0794	Theta star (bias corrected MLE)	0.174
nu hat (MLE)	6.445	nu star (bias corrected)	2.945
Mean (detects)	0.064		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0075	Mean	0.028
Maximum	0.14	Median	0.01
SD	0.0438	CV	1.566
k hat (MLE)	0.892	k star (bias corrected MLE)	0.725
Theta hat (MLE)	0.0314	Theta star (bias corrected MLE)	0.0386
nu hat (MLE)	21.41	nu star (bias corrected)	17.39
Adjusted Level of Significance (β)	0.029		
Approximate Chi Square Value (17.39, α)	8.953	Adjusted Chi Square Value (17.39, β)	8.044
95% Gamma Approximate UCL (use when n>=50)	0.0544	95% Gamma Adjusted UCL (use when n<50)	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0258	SD (KM)	0.0429
Variance (KM)	0.00184	SE of Mean (KM)	0.0143
k hat (KM)	0.362	k star (KM)	0.327
nu hat (KM)	8.682	nu star (KM)	7.845
theta hat (KM)	0.0714	theta star (KM)	0.079
80% gamma percentile (KM)	0.0404	90% gamma percentile (KM)	0.0753
95% gamma percentile (KM)	0.115	99% gamma percentile (KM)	0.217

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (7.84, α)	2.646	Adjusted Chi Square Value (7.84, β)	2.208
95% Gamma Approximate KM-UCL (use when n>=50)	0.0765	95% Gamma Adjusted KM-UCL (use when n<50)	0.0917

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.8	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.296	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.375	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0231	Mean in Log Scale	-5.377
SD in Original Scale	0.0462	SD in Log Scale	1.783
95% t UCL (assumes normality of ROS data)	0.047	95% Percentile Bootstrap UCL	0.0462
95% BCA Bootstrap UCL	0.0559	95% Bootstrap t UCL	0.306
95% H-UCL (Log ROS)	0.254		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-4.502	KM Geo Mean	0.0111
KM SD (logged)	1.07	95% Critical H Value (KM-Log)	3.042
KM Standard Error of Mean (logged)	0.361	95% H-UCL (KM -Log)	0.0524
KM SD (logged)	1.07	95% Critical H Value (KM-Log)	3.042
KM Standard Error of Mean (logged)	0.361		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0256	Mean in Log Scale	-4.574
SD in Original Scale	0.045	SD in Log Scale	1.191
95% t UCL (Assumes normality)	0.0489	95% H-Stat UCL	0.068

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 0.0515

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (4,4'-dde)

General Statistics

Total Number of Observations	12	Number of Distinct Observations	9
Number of Detects	5	Number of Non-Detects	7
Number of Distinct Detects	5	Number of Distinct Non-Detects	5
Minimum Detect	0.0067	Minimum Non-Detect	0.006
Maximum Detect	0.092	Maximum Non-Detect	0.016
Variance Detects	0.00123	Percent Non-Detects	58.33%
Mean Detects	0.0445	SD Detects	0.0351
Median Detects	0.043	CV Detects	0.787
Skewness Detects	0.367	Kurtosis Detects	-1.421
Mean of Logged Detects	-3.481	SD of Logged Detects	1.075

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.954	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.192	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0222	KM Standard Error of Mean	0.00893
KM SD	0.0277	95% KM (BCA) UCL	0.0365
95% KM (t) UCL	0.0383	95% KM (Percentile Bootstrap) UCL	0.0363
95% KM (z) UCL	0.0369	95% KM Bootstrap t UCL	0.039
90% KM Chebyshev UCL	0.049	95% KM Chebyshev UCL	0.0612
97.5% KM Chebyshev UCL	0.078	99% KM Chebyshev UCL	0.111

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.244	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.686	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.192	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.362	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.496	k star (bias corrected MLE)	0.732
Theta hat (MLE)	0.0298	Theta star (bias corrected MLE)	0.0609
nu hat (MLE)	14.96	nu star (bias corrected)	7.318
Mean (detects)	0.0445		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0067	Mean	0.0244
Maximum	0.092	Median	0.01
SD	0.0276	CV	1.133
k hat (MLE)	1.323	k star (bias corrected MLE)	1.048
Theta hat (MLE)	0.0184	Theta star (bias corrected MLE)	0.0233
nu hat (MLE)	31.75	nu star (bias corrected)	25.14
Adjusted Level of Significance (β)	0.029		
Approximate Chi Square Value (25.14, α)	14.72	Adjusted Chi Square Value (25.14, β)	13.52
95% Gamma Approximate UCL (use when n>=50)	0.0417	95% Gamma Adjusted UCL (use when n<50)	0.0454

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0222	SD (KM)	0.0277
Variance (KM)	7.6548E-4	SE of Mean (KM)	0.00893
k hat (KM)	0.646	k star (KM)	0.54
nu hat (KM)	15.5	nu star (KM)	12.96
theta hat (KM)	0.0344	theta star (KM)	0.0412
80% gamma percentile (KM)	0.0366	90% gamma percentile (KM)	0.0592
95% gamma percentile (KM)	0.0831	99% gamma percentile (KM)	0.141

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (12.96, α)	5.864	Adjusted Chi Square Value (12.96, β)	5.154
95% Gamma Approximate KM-UCL (use when n>=50)	0.0491	95% Gamma Adjusted KM-UCL (use when n<50)	0.0559

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.935	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.222	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0203	Mean in Log Scale	-4.937
SD in Original Scale	0.0301	SD in Log Scale	1.514
95% t UCL (assumes normality of ROS data)	0.0359	95% Percentile Bootstrap UCL	0.0351
95% BCA Bootstrap UCL	0.039	95% Bootstrap t UCL	0.052
95% H-UCL (Log ROS)	0.136		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-4.407	KM Geo Mean	0.0122
KM SD (logged)	1	95% Critical H Value (KM-Log)	2.914
KM Standard Error of Mean (logged)	0.324	95% H-UCL (KM -Log)	0.0484
KM SD (logged)	1	95% Critical H Value (KM-Log)	2.914
KM Standard Error of Mean (logged)	0.324		

DL/2 Statistics

DL/2 Normal **DL/2 Log-Transformed**

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Mean in Original Scale	0.022	Mean in Log Scale	-4.496
SD in Original Scale	0.0291	SD in Log Scale	1.152
95% t UCL (Assumes normality)	0.0371	95% H-Stat UCL	0.0657

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.0383

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (4,4'-ddt)

General Statistics

Total Number of Observations	12	Number of Distinct Observations	10
Number of Detects	2	Number of Non-Detects	10
Number of Distinct Detects	2	Number of Distinct Non-Detects	8
Minimum Detect	0.056	Minimum Non-Detect	0.006
Maximum Detect	0.17	Maximum Non-Detect	0.017
Variance Detects	0.0065	Percent Non-Detects	83.33%
Mean Detects	0.113	SD Detects	0.0806
Median Detects	0.113	CV Detects	0.713
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-2.327	SD of Logged Detects	0.785

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0238	KM Standard Error of Mean	0.0188
KM SD	0.0462	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0577	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0548	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0804	95% KM Chebyshev UCL	0.106
97.5% KM Chebyshev UCL	0.142	99% KM Chebyshev UCL	0.211

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	3.564	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0317	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	14.26	nu star (bias corrected)	N/A
Mean (detects)	0.113		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0238	SD (KM)	0.0462
Variance (KM)	0.00213	SE of Mean (KM)	0.0188
k hat (KM)	0.266	k star (KM)	0.255
nu hat (KM)	6.395	nu star (KM)	6.13
theta hat (KM)	0.0894	theta star (KM)	0.0933
80% gamma percentile (KM)	0.0349	90% gamma percentile (KM)	0.0714
95% gamma percentile (KM)	0.115	99% gamma percentile (KM)	0.229

Gamma Kaplan-Meier (KM) Statistics

		Adjusted Level of Significance (β)	0.029
Approximate Chi Square Value (6.13, α)	1.707	Adjusted Chi Square Value (6.13, β)	1.376
95% Gamma Approximate KM-UCL (use when n>=50)	0.0856	95% Gamma Adjusted KM-UCL (use when n<50)	0.106

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0197	Mean in Log Scale	-6.362
SD in Original Scale	0.0499	SD in Log Scale	2.031
95% t UCL (assumes normality of ROS data)	0.0456	95% Percentile Bootstrap UCL	0.0476
95% BCA Bootstrap UCL	0.0618	95% Bootstrap t UCL	1.047
95% H-UCL (Log ROS)	0.296		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-4.651	KM Geo Mean	0.00955
KM SD (logged)	1.064	95% Critical H Value (KM-Log)	3.032
KM Standard Error of Mean (logged)	0.434	95% H-UCL (KM -Log)	0.0445
KM SD (logged)	1.064	95% Critical H Value (KM-Log)	3.032
KM Standard Error of Mean (logged)	0.434		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0237	Mean in Log Scale	-4.743
SD in Original Scale	0.0483	SD in Log Scale	1.215
95% t UCL (Assumes normality)	0.0487	95% H-Stat UCL	0.0615

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL	0.106

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (aluminum)

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

General Statistics

Total Number of Observations	24	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	6700	Mean	29779
Maximum	73000	Median	28000
SD	14349	Std. Error of Mean	2929
Coefficient of Variation	0.482	Skewness	1.245

Normal GOF Test

Shapiro Wilk Test Statistic	0.921	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.166	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.177	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	34799	95% Adjusted-CLT UCL (Chen-1995)	35392
		95% Modified-t UCL (Johnson-1978)	34923

Gamma GOF Test

A-D Test Statistic	0.206	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.747	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.116	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.178	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	4.651	k star (bias corrected MLE)	4.098
Theta hat (MLE)	6402	Theta star (bias corrected MLE)	7267
nu hat (MLE)	223.3	nu star (bias corrected)	196.7
MLE Mean (bias corrected)	29779	MLE Sd (bias corrected)	14711
		Approximate Chi Square Value (0.05)	165.2
Adjusted Level of Significance	0.0392	Adjusted Chi Square Value	163.2

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	35446	95% Adjusted Gamma UCL (use when n<50)	35886

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.969	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.107	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.177	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	8.81	Mean of logged Data	10.19
Maximum of Logged Data	11.2	SD of logged Data	0.5

Assuming Lognormal Distribution

95% H-UCL	37126	90% Chebyshev (MVUE) UCL	39591
95% Chebyshev (MVUE) UCL	43927	97.5% Chebyshev (MVUE) UCL	49943
99% Chebyshev (MVUE) UCL	61763		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	34597	95% Jackknife UCL	34799
95% Standard Bootstrap UCL	34570	95% Bootstrap-t UCL	35936
95% Hall's Bootstrap UCL	36620	95% Percentile Bootstrap UCL	34333
95% BCA Bootstrap UCL	35042		
90% Chebyshev(Mean, Sd) UCL	38566	95% Chebyshev(Mean, Sd) UCL	42547
97.5% Chebyshev(Mean, Sd) UCL	48071	99% Chebyshev(Mean, Sd) UCL	58923

Suggested UCL to Use

95% Student's-t UCL	34799

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (antimony)

General Statistics

Total Number of Observations	24	Number of Distinct Observations	17
Number of Detects	2	Number of Non-Detects	22
Number of Distinct Detects	2	Number of Distinct Non-Detects	15
Minimum Detect	7.7	Minimum Non-Detect	1.1
Maximum Detect	18	Maximum Non-Detect	6.7
Variance Detects	53.05	Percent Non-Detects	91.67%
Mean Detects	12.85	SD Detects	7.283
Median Detects	12.85	CV Detects	0.567
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	2.466	SD of Logged Detects	0.6

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	2.079	KM Standard Error of Mean	1.031
KM SD	3.572	95% KM (BCA) UCL	N/A
95% KM (t) UCL	3.846	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	3.775	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	5.172	95% KM Chebyshev UCL	6.573
97.5% KM Chebyshev UCL	8.518	99% KM Chebyshev UCL	12.34

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Gamma Statistics on Detected Data Only

k hat (MLE)	5.873	k star (bias corrected MLE)	N/A
Theta hat (MLE)	2.188	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	23.49	nu star (bias corrected)	N/A
Mean (detects)	12.85		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.079	SD (KM)	3.572
Variance (KM)	12.76	SE of Mean (KM)	1.031
k hat (KM)	0.339	k star (KM)	0.324
nu hat (KM)	16.27	nu star (KM)	15.57
theta hat (KM)	6.135	theta star (KM)	6.411
80% gamma percentile (KM)	3.245	90% gamma percentile (KM)	6.071
95% gamma percentile (KM)	9.273	99% gamma percentile (KM)	17.52

Gamma Kaplan-Meier (KM) Statistics

		Adjusted Level of Significance (β)	0.0392
Approximate Chi Square Value (15.57, α)	7.657	Adjusted Chi Square Value (15.57, β)	7.268
95% Gamma Approximate KM-UCL (use when n>=50)	4.227	95% Gamma Adjusted KM-UCL (use when n<50)	4.453

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	1.186	Mean in Log Scale	-2.053
SD in Original Scale	3.902	SD in Log Scale	1.649
95% t UCL (assumes normality of ROS data)	2.551	95% Percentile Bootstrap UCL	2.645
95% BCA Bootstrap UCL	3.597	95% Bootstrap t UCL	35.93
95% H-UCL (Log ROS)	1.672		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.293	KM Geo Mean	1.34
KM SD (logged)	0.667	95% Critical H Value (KM-Log)	2.142
KM Standard Error of Mean (logged)	0.192	95% H-UCL (KM -Log)	2.254
KM SD (logged)	0.667	95% Critical H Value (KM-Log)	2.142
KM Standard Error of Mean (logged)	0.192		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	2.796	Mean in Log Scale	0.705
SD in Original Scale	3.521	SD in Log Scale	0.704
95% t UCL (Assumes normality)	4.028	95% H-Stat UCL	3.573

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL	6.573

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (arsenic)

General Statistics

Total Number of Observations	24	Number of Distinct Observations	21
		Number of Missing Observations	0
Minimum	1.1	Mean	45.67
Maximum	110	Median	38.5
SD	26.99	Std. Error of Mean	5.509
Coefficient of Variation	0.591	Skewness	0.901

Normal GOF Test

Shapiro Wilk Test Statistic	0.923	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.181	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.177	Data Not Normal at 5% Significance Level	

Data appear Approximate Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	55.11	95% Adjusted-CLT UCL (Chen-1995)	55.82
		95% Modified-t UCL (Johnson-1978)	55.28

Gamma GOF Test

A-D Test Statistic	0.652	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.754	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.166	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.18	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.178	k star (bias corrected MLE)	1.934
Theta hat (MLE)	20.97	Theta star (bias corrected MLE)	23.62
nu hat (MLE)	104.5	nu star (bias corrected)	92.81
MLE Mean (bias corrected)	45.67	MLE Sd (bias corrected)	32.84
		Approximate Chi Square Value (0.05)	71.6
Adjusted Level of Significance	0.0392	Adjusted Chi Square Value	70.29

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	59.21	95% Adjusted Gamma UCL (use when n<50)	60.31

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.771	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.229	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.177	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.0953	Mean of logged Data	3.575
Maximum of Logged Data	4.7	SD of logged Data	0.913

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Assuming Lognormal Distribution

95% H-UCL	85.98	90% Chebyshev (MVUE) UCL	85.87
95% Chebyshev (MVUE) UCL	100.8	97.5% Chebyshev (MVUE) UCL	121.6
99% Chebyshev (MVUE) UCL	162.3		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	54.73	95% Jackknife UCL	55.11
95% Standard Bootstrap UCL	54.49	95% Bootstrap-t UCL	56.8
95% Hall's Bootstrap UCL	57.31	95% Percentile Bootstrap UCL	54.97
95% BCA Bootstrap UCL	56.21		
90% Chebyshev(Mean, Sd) UCL	62.2	95% Chebyshev(Mean, Sd) UCL	69.69
97.5% Chebyshev(Mean, Sd) UCL	80.08	99% Chebyshev(Mean, Sd) UCL	100.5

Suggested UCL to Use

95% Student's-t UCL 55.11

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test

When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (barium)

General Statistics

Total Number of Observations	24	Number of Distinct Observations	18
Number of Detects	13	Number of Non-Detects	11
Number of Distinct Detects	13	Number of Distinct Non-Detects	8
Minimum Detect	21	Minimum Non-Detect	42
Maximum Detect	1200	Maximum Non-Detect	83
Variance Detects	97988	Percent Non-Detects	45.83%
Mean Detects	160.2	SD Detects	313
Median Detects	79	CV Detects	1.955
Skewness Detects	3.581	Kurtosis Detects	12.88
Mean of Logged Detects	4.46	SD of Logged Detects	0.88

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.367	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.499	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.234	Detected Data Not Normal at 5% Significance Level	

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	99.4	KM Standard Error of Mean	49.2
KM SD	231.2	95% KM (BCA) UCL	240.8
95% KM (t) UCL	183.7	95% KM (Percentile Bootstrap) UCL	197
95% KM (z) UCL	180.3	95% KM Bootstrap t UCL	577.1
90% KM Chebyshev UCL	247	95% KM Chebyshev UCL	313.8
97.5% KM Chebyshev UCL	406.6	99% KM Chebyshev UCL	588.9

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	2.86	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.76	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.45	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.244	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.943	k star (bias corrected MLE)	0.777
Theta hat (MLE)	169.9	Theta star (bias corrected MLE)	206.2
nu hat (MLE)	24.51	nu star (bias corrected)	20.19
Mean (detects)	160.2		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	86.75
Maximum	1200	Median	40
SD	240.3	CV	2.77
k hat (MLE)	0.18	k star (bias corrected MLE)	0.185
Theta hat (MLE)	482.2	Theta star (bias corrected MLE)	468.5
nu hat (MLE)	8.635	nu star (bias corrected)	8.889
Adjusted Level of Significance (β)	0.0392		
Approximate Chi Square Value (8.89, α)	3.26	Adjusted Chi Square Value (8.89, β)	3.024
95% Gamma Approximate UCL (use when n>=50)	236.5	95% Gamma Adjusted UCL (use when n<50)	255

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	99.4	SD (KM)	231.2
Variance (KM)	53467	SE of Mean (KM)	49.2
k hat (KM)	0.185	k star (KM)	0.189
nu hat (KM)	8.871	nu star (KM)	9.095
theta hat (KM)	537.9	theta star (KM)	524.6
80% gamma percentile (KM)	127.2	90% gamma percentile (KM)	300.4
95% gamma percentile (KM)	519.3	99% gamma percentile (KM)	1127

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (9.10, α)	3.385	Adjusted Chi Square Value (9.10, β)	3.143
95% Gamma Approximate KM-UCL (use when n>=50)	267.1	95% Gamma Adjusted KM-UCL (use when n<50)	287.6

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.665	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.357	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.234	Detected Data Not Lognormal at 5% Significance Level	

Detected Data Not Lognormal at 5% Significance Level

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	98.15	Mean in Log Scale	3.871
SD in Original Scale	236.4	SD in Log Scale	0.933
95% t UCL (assumes normality of ROS data)	180.9	95% Percentile Bootstrap UCL	192.2
95% BCA Bootstrap UCL	244.2	95% Bootstrap t UCL	571.3
95% H-UCL (Log ROS)	119.5		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	3.89	KM Geo Mean	48.89
KM SD (logged)	0.919	95% Critical H Value (KM-Log)	2.437
KM Standard Error of Mean (logged)	0.207	95% H-UCL (KM -Log)	119
KM SD (logged)	0.919	95% Critical H Value (KM-Log)	2.437
KM Standard Error of Mean (logged)	0.207		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	100.7	Mean in Log Scale	3.971
SD in Original Scale	235.6	SD in Log Scale	0.847
95% t UCL (Assumes normality)	183.1	95% H-Stat UCL	115.1

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL 313.8

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (benzo(a)anthracene)

General Statistics

Total Number of Observations	12	Number of Distinct Observations	8
Number of Detects	3	Number of Non-Detects	9
Number of Distinct Detects	3	Number of Distinct Non-Detects	7
Minimum Detect	0.14	Minimum Non-Detect	0.079
Maximum Detect	0.22	Maximum Non-Detect	0.3
Variance Detects	0.00163	Percent Non-Detects	75%
Mean Detects	0.177	SD Detects	0.0404
Median Detects	0.17	CV Detects	0.229
Skewness Detects	0.722	Kurtosis Detects	N/A
Mean of Logged Detects	-1.751	SD of Logged Detects	0.227

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.98	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.232	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.131	KM Standard Error of Mean	0.0252
KM SD	0.0455	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.177	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.173	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.207	95% KM Chebyshev UCL	0.241
97.5% KM Chebyshev UCL	0.289	99% KM Chebyshev UCL	0.382

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	29.16	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00606	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	175	nu star (bias corrected)	N/A
Mean (detects)	0.177		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0919	Mean	0.135
Maximum	0.22	Median	0.129
SD	0.0342	CV	0.253
k hat (MLE)	19.16	k star (bias corrected MLE)	14.42
Theta hat (MLE)	0.00707	Theta star (bias corrected MLE)	0.00938
nu hat (MLE)	459.8	nu star (bias corrected)	346.2
Adjusted Level of Significance (β)	0.029		
Approximate Chi Square Value (346.19, α)	304.1	Adjusted Chi Square Value (346.19, β)	298
95% Gamma Approximate UCL (use when n>=50)	0.154	95% Gamma Adjusted UCL (use when n<50)	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.131	SD (KM)	0.0455
Variance (KM)	0.00207	SE of Mean (KM)	0.0252
k hat (KM)	8.353	k star (KM)	6.32
nu hat (KM)	200.5	nu star (KM)	151.7
theta hat (KM)	0.0157	theta star (KM)	0.0208
80% gamma percentile (KM)	0.172	90% gamma percentile (KM)	0.201
95% gamma percentile (KM)	0.228	99% gamma percentile (KM)	0.282

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (151.69, α)	124.2	Adjusted Chi Square Value (151.69, β)	120.4
95% Gamma Approximate KM-UCL (use when n>=50)	0.161	95% Gamma Adjusted KM-UCL (use when n<50)	0.166

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.993	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Lilliefors Test Statistic	0.204	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.139	Mean in Log Scale	-1.996
SD in Original Scale	0.0314	SD in Log Scale	0.205
95% t UCL (assumes normality of ROS data)	0.155	95% Percentile Bootstrap UCL	0.154
95% BCA Bootstrap UCL	0.158	95% Bootstrap t UCL	0.165
95% H-UCL (Log ROS)	0.156		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-2.092	KM Geo Mean	0.123
KM SD (logged)	0.36	95% Critical H Value (KM-Log)	1.984
KM Standard Error of Mean (logged)	0.215	95% H-UCL (KM -Log)	0.163
KM SD (logged)	0.36	95% Critical H Value (KM-Log)	1.984
KM Standard Error of Mean (logged)	0.215		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.12	Mean in Log Scale	-2.204
SD in Original Scale	0.0471	SD in Log Scale	0.439
95% t UCL (Assumes normality)	0.144	95% H-Stat UCL	0.16

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.177

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (benzo(a)pyrene)

General Statistics

Total Number of Observations	12	Number of Distinct Observations	8
Number of Detects	3	Number of Non-Detects	9
Number of Distinct Detects	3	Number of Distinct Non-Detects	7
Minimum Detect	0.17	Minimum Non-Detect	0.079
Maximum Detect	0.27	Maximum Non-Detect	0.3
Variance Detects	0.00253	Percent Non-Detects	75%
Mean Detects	0.217	SD Detects	0.0503
Median Detects	0.21	CV Detects	0.232
Skewness Detects	0.586	Kurtosis Detects	N/A
Mean of Logged Detects	-1.547	SD of Logged Detects	0.232

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.987	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.219	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.129	KM Standard Error of Mean	0.0289
KM SD	0.0662	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.181	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.177	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.216	95% KM Chebyshev UCL	0.255
97.5% KM Chebyshev UCL	0.31	99% KM Chebyshev UCL	0.417

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	28.07	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00772	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	168.4	nu star (bias corrected)	N/A
Mean (detects)	0.217		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0695	Mean	0.135
Maximum	0.27	Median	0.121
SD	0.0575	CV	0.426
k hat (MLE)	7.066	k star (bias corrected MLE)	5.355
Theta hat (MLE)	0.0191	Theta star (bias corrected MLE)	0.0252
nu hat (MLE)	169.6	nu star (bias corrected)	128.5
Adjusted Level of Significance (β)	0.029		
Approximate Chi Square Value (128.52, α)	103.3	Adjusted Chi Square Value (128.52, β)	99.89
95% Gamma Approximate UCL (use when n>=50)	0.168	95% Gamma Adjusted UCL (use when n<50)	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.129	SD (KM)	0.0662
Variance (KM)	0.00438	SE of Mean (KM)	0.0289
k hat (KM)	3.821	k star (KM)	2.921
nu hat (KM)	91.7	nu star (KM)	70.11
theta hat (KM)	0.0339	theta star (KM)	0.0443
80% gamma percentile (KM)	0.185	90% gamma percentile (KM)	0.231
95% gamma percentile (KM)	0.274	99% gamma percentile (KM)	0.366

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (70.11, α)	51.84	Adjusted Chi Square Value (70.11, β)	49.44
95% Gamma Approximate KM-UCL (use when n>=50)	0.175	95% Gamma Adjusted KM-UCL (use when n<50)	0.183

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.997	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.19	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.148	Mean in Log Scale	-1.954
SD in Original Scale	0.0489	SD in Log Scale	0.288
95% t UCL (assumes normality of ROS data)	0.173	95% Percentile Bootstrap UCL	0.173
95% BCA Bootstrap UCL	0.177	95% Bootstrap t UCL	0.199
95% H-UCL (Log ROS)	0.174		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-2.163	KM Geo Mean	0.115
KM SD (logged)	0.471	95% Critical H Value (KM-Log)	2.106
KM Standard Error of Mean (logged)	0.216	95% H-UCL (KM -Log)	0.173
KM SD (logged)	0.471	95% Critical H Value (KM-Log)	2.106
KM Standard Error of Mean (logged)	0.216		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.13	Mean in Log Scale	-2.153
SD in Original Scale	0.0629	SD in Log Scale	0.502
95% t UCL (Assumes normality)	0.162	95% H-Stat UCL	0.182

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.181

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (benzo(b)fluoranthene)

General Statistics

Total Number of Observations	12	Number of Distinct Observations	10
Number of Detects	6	Number of Non-Detects	6
Number of Distinct Detects	6	Number of Distinct Non-Detects	4
Minimum Detect	0.15	Minimum Non-Detect	0.079
Maximum Detect	0.35	Maximum Non-Detect	0.26
Variance Detects	0.00676	Percent Non-Detects	50%
Mean Detects	0.27	SD Detects	0.0822
Median Detects	0.295	CV Detects	0.305
Skewness Detects	-0.712	Kurtosis Detects	-1.412
Mean of Logged Detects	-1.355	SD of Logged Detects	0.346

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.889	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.215	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.325	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.2	KM Standard Error of Mean	0.0335
KM SD	0.0942	95% KM (BCA) UCL	0.256
95% KM (t) UCL	0.26	95% KM (Percentile Bootstrap) UCL	0.253
95% KM (z) UCL	0.255	95% KM Bootstrap t UCL	0.242
90% KM Chebyshev UCL	0.3	95% KM Chebyshev UCL	0.346
97.5% KM Chebyshev UCL	0.409	99% KM Chebyshev UCL	0.533

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.468	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.698	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.254	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.332	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	11.09	k star (bias corrected MLE)	5.655
Theta hat (MLE)	0.0244	Theta star (bias corrected MLE)	0.0477
nu hat (MLE)	133.1	nu star (bias corrected)	67.86
Mean (detects)	0.27		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0816	Mean	0.204
Maximum	0.35	Median	0.171
SD	0.0922	CV	0.451
k hat (MLE)	5.323	k star (bias corrected MLE)	4.048
Theta hat (MLE)	0.0384	Theta star (bias corrected MLE)	0.0505
nu hat (MLE)	127.8	nu star (bias corrected)	97.15
Adjusted Level of Significance (β)	0.029		
Approximate Chi Square Value (97.15, α)	75.42	Adjusted Chi Square Value (97.15, β)	72.5
95% Gamma Approximate UCL (use when n>=50)	0.263	95% Gamma Adjusted UCL (use when n<50)	0.274

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.2	SD (KM)	0.0942
Variance (KM)	0.00888	SE of Mean (KM)	0.0335
k hat (KM)	4.494	k star (KM)	3.426
nu hat (KM)	107.9	nu star (KM)	82.22
theta hat (KM)	0.0445	theta star (KM)	0.0583
80% gamma percentile (KM)	0.28	90% gamma percentile (KM)	0.345
95% gamma percentile (KM)	0.404	99% gamma percentile (KM)	0.532

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (82.22, α)	62.33	Adjusted Chi Square Value (82.22, β)	59.69
95% Gamma Approximate KM-UCL (use when n>=50)	0.264	95% Gamma Adjusted KM-UCL (use when n<50)	0.275

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.861	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.261	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.325	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.207	Mean in Log Scale	-1.655
SD in Original Scale	0.0883	SD in Log Scale	0.417
95% t UCL (assumes normality of ROS data)	0.253	95% Percentile Bootstrap UCL	0.248
95% BCA Bootstrap UCL	0.255	95% Bootstrap t UCL	0.264
95% H-UCL (Log ROS)	0.27		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.736	KM Geo Mean	0.176
KM SD (logged)	0.519	95% Critical H Value (KM-Log)	2.165
KM Standard Error of Mean (logged)	0.206	95% H-UCL (KM -Log)	0.283
KM SD (logged)	0.519	95% Critical H Value (KM-Log)	2.165
KM Standard Error of Mean (logged)	0.206		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.185	Mean in Log Scale	-1.864
SD in Original Scale	0.107	SD in Log Scale	0.648
95% t UCL (Assumes normality)	0.24	95% H-Stat UCL	0.302

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.26

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (benzo(g,h,i)perylene)

General Statistics

Total Number of Observations	12	Number of Distinct Observations	9
Number of Detects	3	Number of Non-Detects	9
Number of Distinct Detects	3	Number of Distinct Non-Detects	7
Minimum Detect	0.19	Minimum Non-Detect	0.079
Maximum Detect	0.24	Maximum Non-Detect	0.3
Variance Detects	6.3333E-4	Percent Non-Detects	75%
Mean Detects	0.217	SD Detects	0.0252
Median Detects	0.22	CV Detects	0.116
Skewness Detects	-0.586	Kurtosis Detects	N/A
Mean of Logged Detects	-1.534	SD of Logged Detects	0.118

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.987	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.219	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.131	KM Standard Error of Mean	0.0304
KM SD	0.0656	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.186	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.181	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.222	95% KM Chebyshev UCL	0.264
97.5% KM Chebyshev UCL	0.321	99% KM Chebyshev UCL	0.434

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	108.9	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00199	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	653.7	nu star (bias corrected)	N/A
Mean (detects)	0.217		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.125	Mean	0.167
Maximum	0.24	Median	0.158
SD	0.0346	CV	0.207
k hat (MLE)	27.67	k star (bias corrected MLE)	20.8
Theta hat (MLE)	0.00604	Theta star (bias corrected MLE)	0.00803
nu hat (MLE)	664	nu star (bias corrected)	499.3
Adjusted Level of Significance (β)	0.029		
Approximate Chi Square Value (499.30, α)	448.5	Adjusted Chi Square Value (499.30, β)	441.1
95% Gamma Approximate UCL (use when n>=50)	0.186	95% Gamma Adjusted UCL (use when n<50)	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.131	SD (KM)	0.0656
Variance (KM)	0.0043	SE of Mean (KM)	0.0304
k hat (KM)	4.017	k star (KM)	3.068

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

nu hat (KM)	96.4	nu star (KM)	73.63
theta hat (KM)	0.0327	theta star (KM)	0.0428
80% gamma percentile (KM)	0.187	90% gamma percentile (KM)	0.232
95% gamma percentile (KM)	0.274	99% gamma percentile (KM)	0.365

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (73.63, α)	54.87	Adjusted Chi Square Value (73.63, β)	52.41
95% Gamma Approximate KM-UCL (use when n>=50)	0.176	95% Gamma Adjusted KM-UCL (use when n<50)	0.185

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.979	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.233	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.172	Mean in Log Scale	-1.776
SD in Original Scale	0.0312	SD in Log Scale	0.169
95% t UCL (assumes normality of ROS data)	0.188	95% Percentile Bootstrap UCL	0.187
95% BCA Bootstrap UCL	0.19	95% Bootstrap t UCL	0.197
95% H-UCL (Log ROS)	0.189		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-2.149	KM Geo Mean	0.117
KM SD (logged)	0.481	95% Critical H Value (KM-Log)	2.118
KM Standard Error of Mean (logged)	0.228	95% H-UCL (KM -Log)	0.178
KM SD (logged)	0.481	95% Critical H Value (KM-Log)	2.118
KM Standard Error of Mean (logged)	0.228		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.13	Mean in Log Scale	-2.15
SD in Original Scale	0.0601	SD in Log Scale	0.499
95% t UCL (Assumes normality)	0.161	95% H-Stat UCL	0.182

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 0.186

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (benzo(k)fluoranthene)

General Statistics

Total Number of Observations	12	Number of Distinct Observations	10
Number of Detects	1	Number of Non-Detects	11
Number of Distinct Detects	1	Number of Distinct Non-Detects	9

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable result (benzo(k)fluoranthene) was not processed!

result (beryllium)

General Statistics

Total Number of Observations	24	Number of Distinct Observations	17
Number of Detects	22	Number of Non-Detects	2
Number of Distinct Detects	15	Number of Distinct Non-Detects	2
Minimum Detect	0.98	Minimum Non-Detect	0.28
Maximum Detect	19	Maximum Non-Detect	1
Variance Detects	14.19	Percent Non-Detects	8.333%
Mean Detects	4.072	SD Detects	3.766
Median Detects	2.9	CV Detects	0.925
Skewness Detects	3.173	Kurtosis Detects	12.3
Mean of Logged Detects	1.152	SD of Logged Detects	0.682

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.645	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.911	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.223	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.184	Detected Data Not Normal at 5% Significance Level	

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	3.77	KM Standard Error of Mean	0.766
KM SD	3.663	95% KM (BCA) UCL	5.178
95% KM (t) UCL	5.082	95% KM (Percentile Bootstrap) UCL	5.199
95% KM (z) UCL	5.03	95% KM Bootstrap t UCL	6.109
90% KM Chebyshev UCL	6.067	95% KM Chebyshev UCL	7.107
97.5% KM Chebyshev UCL	8.551	99% KM Chebyshev UCL	11.39

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.658	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.755	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.13	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.188	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	2.137	k star (bias corrected MLE)	1.876
Theta hat (MLE)	1.906	Theta star (bias corrected MLE)	2.171
nu hat (MLE)	94.02	nu star (bias corrected)	82.53
Mean (detects)	4.072		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	3.733
Maximum	19	Median	2.7
SD	3.777	CV	1.012
k hat (MLE)	0.906	k star (bias corrected MLE)	0.82
Theta hat (MLE)	4.121	Theta star (bias corrected MLE)	4.551
nu hat (MLE)	43.48	nu star (bias corrected)	39.38
Adjusted Level of Significance (β)	0.0392		
Approximate Chi Square Value (39.38, α)	26	Adjusted Chi Square Value (39.38, β)	25.24
95% Gamma Approximate UCL (use when n>=50)	5.654	95% Gamma Adjusted UCL (use when n<50)	5.825

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	3.77	SD (KM)	3.663
Variance (KM)	13.42	SE of Mean (KM)	0.766
k hat (KM)	1.059	k star (KM)	0.955
nu hat (KM)	50.85	nu star (KM)	45.83
theta hat (KM)	3.559	theta star (KM)	3.949
80% gamma percentile (KM)	6.09	90% gamma percentile (KM)	8.781
95% gamma percentile (KM)	11.48	99% gamma percentile (KM)	17.77

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (45.83, α)	31.3	Adjusted Chi Square Value (45.83, β)	30.45
95% Gamma Approximate KM-UCL (use when n>=50)	5.521	95% Gamma Adjusted KM-UCL (use when n<50)	5.674

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.956	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.911	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0921	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.184	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	3.79	Mean in Log Scale	1.025
SD in Original Scale	3.723	SD in Log Scale	0.782
95% t UCL (assumes normality of ROS data)	5.093	95% Percentile Bootstrap UCL	5.178
95% BCA Bootstrap UCL	5.52	95% Bootstrap t UCL	6.033
95% H-UCL (Log ROS)	5.483		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.976	KM Geo Mean	2.654
KM SD (logged)	0.879	95% Critical H Value (KM-Log)	2.387
KM Standard Error of Mean (logged)	0.187	95% H-UCL (KM -Log)	6.049
KM SD (logged)	0.879	95% Critical H Value (KM-Log)	2.387
KM Standard Error of Mean (logged)	0.187		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	3.759	Mean in Log Scale	0.945
SD in Original Scale	3.752	SD in Log Scale	0.975
95% t UCL (Assumes normality)	5.072	95% H-Stat UCL	6.899

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	5.674	95% GROS Adjusted Gamma UCL	5.825

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (bis(2-ethylhexyl)phthalate)

General Statistics

Total Number of Observations	12	Number of Distinct Observations	11
Number of Detects	6	Number of Non-Detects	6
Number of Distinct Detects	6	Number of Distinct Non-Detects	5
Minimum Detect	0.2	Minimum Non-Detect	0.079
Maximum Detect	0.57	Maximum Non-Detect	0.3
Variance Detects	0.0164	Percent Non-Detects	50%
Mean Detects	0.372	SD Detects	0.128
Median Detects	0.375	CV Detects	0.344
Skewness Detects	0.313	Kurtosis Detects	0.272
Mean of Logged Detects	-1.042	SD of Logged Detects	0.364

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.988	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.158	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.325	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.241	KM Standard Error of Mean	0.0531
KM SD	0.16	95% KM (BCA) UCL	0.335
95% KM (t) UCL	0.336	95% KM (Percentile Bootstrap) UCL	0.33
95% KM (z) UCL	0.328	95% KM Bootstrap t UCL	0.308
90% KM Chebyshev UCL	0.4	95% KM Chebyshev UCL	0.472
97.5% KM Chebyshev UCL	0.573	99% KM Chebyshev UCL	0.77

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.167	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.698	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.136	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.333	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	9.656	k star (bias corrected MLE)	4.939
Theta hat (MLE)	0.0385	Theta star (bias corrected MLE)	0.0753
nu hat (MLE)	115.9	nu star (bias corrected)	59.27
Mean (detects)	0.372		

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0592	Mean	0.234
Maximum	0.57	Median	0.178
SD	0.17	CV	0.727
k hat (MLE)	1.927	k star (bias corrected MLE)	1.501
Theta hat (MLE)	0.121	Theta star (bias corrected MLE)	0.156
nu hat (MLE)	46.26	nu star (bias corrected)	36.03
Adjusted Level of Significance (β)	0.029		
Approximate Chi Square Value (36.03, α)	23.29	Adjusted Chi Square Value (36.03, β)	21.74
95% Gamma Approximate UCL (use when n>=50)	0.362	95% Gamma Adjusted UCL (use when n<50)	0.388

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.241	SD (KM)	0.16
Variance (KM)	0.0256	SE of Mean (KM)	0.0531
k hat (KM)	2.267	k star (KM)	1.756
nu hat (KM)	54.4	nu star (KM)	42.14
theta hat (KM)	0.106	theta star (KM)	0.137
80% gamma percentile (KM)	0.366	90% gamma percentile (KM)	0.483
95% gamma percentile (KM)	0.595	99% gamma percentile (KM)	0.847

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (42.14, α)	28.26	Adjusted Chi Square Value (42.14, β)	26.53
95% Gamma Approximate KM-UCL (use when n>=50)	0.359	95% Gamma Adjusted KM-UCL (use when n<50)	0.382

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.982	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.159	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.325	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.26	Mean in Log Scale	-1.484
SD in Original Scale	0.146	SD in Log Scale	0.534
95% t UCL (assumes normality of ROS data)	0.335	95% Percentile Bootstrap UCL	0.329
95% BCA Bootstrap UCL	0.339	95% Bootstrap t UCL	0.36
95% H-UCL (Log ROS)	0.372		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.676	KM Geo Mean	0.187
KM SD (logged)	0.736	95% Critical H Value (KM-Log)	2.468
KM Standard Error of Mean (logged)	0.263	95% H-UCL (KM -Log)	0.424
KM SD (logged)	0.736	95% Critical H Value (KM-Log)	2.468
KM Standard Error of Mean (logged)	0.263		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.236	Mean in Log Scale	-1.716
SD in Original Scale	0.168	SD in Log Scale	0.814
95% t UCL (Assumes normality)	0.323	95% H-Stat UCL	0.473

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.336

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (cadmium)

General Statistics

Total Number of Observations	24	Number of Distinct Observations	15
Number of Detects	2	Number of Non-Detects	22
Number of Distinct Detects	2	Number of Distinct Non-Detects	13
Minimum Detect	2.9	Minimum Non-Detect	0.56
Maximum Detect	20	Maximum Non-Detect	3.3
Variance Detects	146.2	Percent Non-Detects	91.67%
Mean Detects	11.45	SD Detects	12.09
Median Detects	11.45	CV Detects	1.056
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	2.03	SD of Logged Detects	1.365

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.477	KM Standard Error of Mean	1.125
KM SD	3.893	95% KM (BCA) UCL	N/A
95% KM (t) UCL	3.404	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	3.327	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	4.851	95% KM Chebyshev UCL	6.379
97.5% KM Chebyshev UCL	8.5	99% KM Chebyshev UCL	12.67

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	1.369	k star (bias corrected MLE)	N/A
Theta hat (MLE)	8.364	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	5.476	nu star (bias corrected)	N/A
Mean (detects)	11.45		

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.477	SD (KM)	3.893
Variance (KM)	15.16	SE of Mean (KM)	1.125
k hat (KM)	0.144	k star (KM)	0.154
nu hat (KM)	6.907	nu star (KM)	7.377
theta hat (KM)	10.26	theta star (KM)	9.609
80% gamma percentile (KM)	1.639	90% gamma percentile (KM)	4.393
95% gamma percentile (KM)	8.089	99% gamma percentile (KM)	18.76

Gamma Kaplan-Meier (KM) Statistics

		Adjusted Level of Significance (β)	0.0392
Approximate Chi Square Value (7.38, α)	2.38	Adjusted Chi Square Value (7.38, β)	2.185
95% Gamma Approximate KM-UCL (use when n>=50)	4.578	95% Gamma Adjusted KM-UCL (use when n<50)	4.986

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.971	Mean in Log Scale	-4.426
SD in Original Scale	4.096	SD in Log Scale	2.48
95% t UCL (assumes normality of ROS data)	2.403	95% Percentile Bootstrap UCL	2.63
95% BCA Bootstrap UCL	3.477	95% Bootstrap t UCL	137.4
95% H-UCL (Log ROS)	3.284		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.356	KM Geo Mean	0.701
KM SD (logged)	0.778	95% Critical H Value (KM-Log)	2.266
KM Standard Error of Mean (logged)	0.227	95% H-UCL (KM -Log)	1.37
KM SD (logged)	0.778	95% Critical H Value (KM-Log)	2.266
KM Standard Error of Mean (logged)	0.227		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	1.841	Mean in Log Scale	0.059
SD in Original Scale	3.904	SD in Log Scale	0.799
95% t UCL (Assumes normality)	3.207	95% H-Stat UCL	2.138

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL	6.379

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (calcium)

General Statistics

Total Number of Observations	24	Number of Distinct Observations	20
Number of Detects	16	Number of Non-Detects	8
Number of Distinct Detects	15	Number of Distinct Non-Detects	5
Minimum Detect	2800	Minimum Non-Detect	1400
Maximum Detect	14000	Maximum Non-Detect	8300
Variance Detects	7304958	Percent Non-Detects	33.33%
Mean Detects	6731	SD Detects	2703
Median Detects	6900	CV Detects	0.402
Skewness Detects	1.008	Kurtosis Detects	2.498
Mean of Logged Detects	8.738	SD of Logged Detects	0.413

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.916	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.149	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.213	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	5606	KM Standard Error of Mean	631.2
KM SD	2829	95% KM (BCA) UCL	6703
95% KM (t) UCL	6688	95% KM (Percentile Bootstrap) UCL	6641
95% KM (z) UCL	6644	95% KM Bootstrap t UCL	6733
90% KM Chebyshev UCL	7499	95% KM Chebyshev UCL	8357
97.5% KM Chebyshev UCL	9548	99% KM Chebyshev UCL	11886

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.346	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.741	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.126	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.216	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	6.711	k star (bias corrected MLE)	5.494
Theta hat (MLE)	1003	Theta star (bias corrected MLE)	1225
nu hat (MLE)	214.7	nu star (bias corrected)	175.8
Mean (detects)	6731		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	1516	Mean	5642
Maximum	14000	Median	4935
SD	2774	CV	0.492
k hat (MLE)	4.412	k star (bias corrected MLE)	3.888
Theta hat (MLE)	1279	Theta star (bias corrected MLE)	1451
nu hat (MLE)	211.8	nu star (bias corrected)	186.6
Adjusted Level of Significance (β)	0.0392		
Approximate Chi Square Value (186.64, α)	156	Adjusted Chi Square Value (186.64, β)	154.1

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

95% Gamma Approximate UCL (use when n>=50)	6748	95% Gamma Adjusted UCL (use when n<50)	6834

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	5606	SD (KM)	2829
Variance (KM)	8001356	SE of Mean (KM)	631.2
k hat (KM)	3.928	k star (KM)	3.464
nu hat (KM)	188.5	nu star (KM)	166.3
theta hat (KM)	1427	theta star (KM)	1618
80% gamma percentile (KM)	7860	90% gamma percentile (KM)	9644
95% gamma percentile (KM)	11297	99% gamma percentile (KM)	14853

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (166.29, α)	137.5	Adjusted Chi Square Value (166.29, β)	135.6
95% Gamma Approximate KM-UCL (use when n>=50)	6781	95% Gamma Adjusted KM-UCL (use when n<50)	6873

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.95	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.136	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.213	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	5702	Mean in Log Scale	8.549
SD in Original Scale	2690	SD in Log Scale	0.456
95% t UCL (assumes normality of ROS data)	6643	95% Percentile Bootstrap UCL	6648
95% BCA Bootstrap UCL	6732	95% Bootstrap t UCL	6877
95% H-UCL (Log ROS)	6888		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	8.487	KM Geo Mean	4853
KM SD (logged)	0.572	95% Critical H Value (KM-Log)	2.046
KM Standard Error of Mean (logged)	0.139	95% H-UCL (KM -Log)	7292
KM SD (logged)	0.572	95% Critical H Value (KM-Log)	2.046
KM Standard Error of Mean (logged)	0.139		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	5419	Mean in Log Scale	8.438
SD in Original Scale	2944	SD in Log Scale	0.625
95% t UCL (Assumes normality)	6449	95% H-Stat UCL	7384

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	6688

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (carbon disulfide)

General Statistics

Total Number of Observations	12	Number of Distinct Observations	11
Number of Detects	1	Number of Non-Detects	11
Number of Distinct Detects	1	Number of Distinct Non-Detects	10

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable result (carbon disulfide) was not processed!

result (chlordane)

General Statistics

Total Number of Observations	12	Number of Distinct Observations	11
Number of Detects	2	Number of Non-Detects	10
Number of Distinct Detects	2	Number of Distinct Non-Detects	9
Minimum Detect	0.03	Minimum Non-Detect	0.012
Maximum Detect	0.053	Maximum Non-Detect	0.16
Variance Detects	2.6450E-4	Percent Non-Detects	83.33%
Mean Detects	0.0415	SD Detects	0.0163
Median Detects	0.0415	CV Detects	0.392
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-3.222	SD of Logged Detects	0.402

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0181	KM Standard Error of Mean	0.00562
KM SD	0.0126	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0282	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0273	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0349	95% KM Chebyshev UCL	0.0426
97.5% KM Chebyshev UCL	0.0531	99% KM Chebyshev UCL	0.074

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	12.68	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00327	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	50.72	nu star (bias corrected)	N/A
Mean (detects)	0.0415		

Estimates of Gamma Parameters using KM Estimates

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Mean (KM)	0.0181	SD (KM)	0.0126
Variance (KM)	1.5811E-4	SE of Mean (KM)	0.00562
k hat (KM)	2.064	k star (KM)	1.604
nu hat (KM)	49.54	nu star (KM)	38.49
theta hat (KM)	0.00875	theta star (KM)	0.0113
80% gamma percentile (KM)	0.0277	90% gamma percentile (KM)	0.037
95% gamma percentile (KM)	0.046	99% gamma percentile (KM)	0.0662

Gamma Kaplan-Meier (KM) Statistics

		Adjusted Level of Significance (β)	0.029
Approximate Chi Square Value (38.49, α)	25.28	Adjusted Chi Square Value (38.49, β)	23.65
95% Gamma Approximate KM-UCL (use when n>=50)	0.0275	95% Gamma Adjusted KM-UCL (use when n<50)	0.0294

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0161	Mean in Log Scale	-4.309
SD in Original Scale	0.013	SD in Log Scale	0.546
95% t UCL (assumes normality of ROS data)	0.0228	95% Percentile Bootstrap UCL	0.0229
95% BCA Bootstrap UCL	0.0248	95% Bootstrap t UCL	0.0498
95% H-UCL (Log ROS)	0.0224		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-4.169	KM Geo Mean	0.0155
KM SD (logged)	0.495	95% Critical H Value (KM-Log)	2.135
KM Standard Error of Mean (logged)	0.228	95% H-UCL (KM -Log)	0.0241
KM SD (logged)	0.495	95% Critical H Value (KM-Log)	2.135
KM Standard Error of Mean (logged)	0.228		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0218	Mean in Log Scale	-4.189
SD in Original Scale	0.0226	SD in Log Scale	0.831
95% t UCL (Assumes normality)	0.0335	95% H-Stat UCL	0.0413

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.0282	KM H-UCL	0.0241
95% KM (BCA) UCL	N/A		

Warning: One or more Recommended UCL(s) not available!

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (chlordane, alpha)

General Statistics

Total Number of Observations	12	Number of Distinct Observations	11
Number of Detects	2	Number of Non-Detects	10
Number of Distinct Detects	2	Number of Distinct Non-Detects	9
Minimum Detect	0.03	Minimum Non-Detect	0.012
Maximum Detect	0.053	Maximum Non-Detect	0.16
Variance Detects	2.6450E-4	Percent Non-Detects	83.33%
Mean Detects	0.0415	SD Detects	0.0163
Median Detects	0.0415	CV Detects	0.392
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-3.222	SD of Logged Detects	0.402

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0181	KM Standard Error of Mean	0.00562
KM SD	0.0126	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0282	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0273	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0349	95% KM Chebyshev UCL	0.0426
97.5% KM Chebyshev UCL	0.0531	99% KM Chebyshev UCL	0.074

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	12.68	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00327	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	50.72	nu star (bias corrected)	N/A
Mean (detects)	0.0415		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0181	SD (KM)	0.0126
Variance (KM)	1.5811E-4	SE of Mean (KM)	0.00562
k hat (KM)	2.064	k star (KM)	1.604
nu hat (KM)	49.54	nu star (KM)	38.49
theta hat (KM)	0.00875	theta star (KM)	0.0113
80% gamma percentile (KM)	0.0277	90% gamma percentile (KM)	0.037
95% gamma percentile (KM)	0.046	99% gamma percentile (KM)	0.0662

Gamma Kaplan-Meier (KM) Statistics

		Adjusted Level of Significance (β)	0.029
Approximate Chi Square Value (38.49, α)	25.28	Adjusted Chi Square Value (38.49, β)	23.65
95% Gamma Approximate KM-UCL (use when n>=50)	0.0275	95% Gamma Adjusted KM-UCL (use when n<50)	0.0294

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Mean in Original Scale	0.0161	Mean in Log Scale	-4.309
SD in Original Scale	0.013	SD in Log Scale	0.546
95% t UCL (assumes normality of ROS data)	0.0228	95% Percentile Bootstrap UCL	0.0226
95% BCA Bootstrap UCL	0.0262	95% Bootstrap t UCL	0.0498
95% H-UCL (Log ROS)	0.0224		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-4.169	KM Geo Mean	0.0155
KM SD (logged)	0.495	95% Critical H Value (KM-Log)	2.135
KM Standard Error of Mean (logged)	0.228	95% H-UCL (KM -Log)	0.0241
KM SD (logged)	0.495	95% Critical H Value (KM-Log)	2.135
KM Standard Error of Mean (logged)	0.228		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0218	Mean in Log Scale	-4.189
SD in Original Scale	0.0226	SD in Log Scale	0.831
95% t UCL (Assumes normality)	0.0335	95% H-Stat UCL	0.0413

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.0282	KM H-UCL	0.0241
95% KM (BCA) UCL	N/A		

Warning: One or more Recommended UCL(s) not available!

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (chromium (total))

General Statistics

Total Number of Observations	24	Number of Distinct Observations	21
		Number of Missing Observations	0
Minimum	52	Mean	228
Maximum	1400	Median	155
SD	275.2	Std. Error of Mean	56.17
Coefficient of Variation	1.207	Skewness	3.604

Normal GOF Test

Shapiro Wilk Test Statistic	0.582	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.261	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.177	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	324.3	95% Adjusted-CLT UCL (Chen-1995)	364.5
		95% Modified-t UCL (Johnson-1978)	331.2

Gamma GOF Test

A-D Test Statistic	0.761	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.763	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.133	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.181	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.434	k star (bias corrected MLE)	1.282
Theta hat (MLE)	159	Theta star (bias corrected MLE)	177.8
nu hat (MLE)	68.82	nu star (bias corrected)	61.55
MLE Mean (bias corrected)	228	MLE Sd (bias corrected)	201.3
		Approximate Chi Square Value (0.05)	44.5
Adjusted Level of Significance	0.0392	Adjusted Chi Square Value	43.48

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	315.3	95% Adjusted Gamma UCL (use when n<50)	322.7

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.936	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.115	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.177	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	3.951	Mean of logged Data	5.042
Maximum of Logged Data	7.244	SD of logged Data	0.839

Assuming Lognormal Distribution

95% H-UCL	331.2	90% Chebyshev (MVUE) UCL	338
95% Chebyshev (MVUE) UCL	393.3	97.5% Chebyshev (MVUE) UCL	470.1
99% Chebyshev (MVUE) UCL	620.9		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	320.4	95% Jackknife UCL	324.3
95% Standard Bootstrap UCL	318.5	95% Bootstrap-t UCL	433.2
95% Hall's Bootstrap UCL	692.8	95% Percentile Bootstrap UCL	330
95% BCA Bootstrap UCL	365.3		
90% Chebyshev(Mean, Sd) UCL	396.5	95% Chebyshev(Mean, Sd) UCL	472.8
97.5% Chebyshev(Mean, Sd) UCL	578.8	99% Chebyshev(Mean, Sd) UCL	786.9

Suggested UCL to Use

95% Adjusted Gamma UCL	322.7

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (chrysene)

General Statistics

Total Number of Observations	12	Number of Distinct Observations	8
Number of Detects	3	Number of Non-Detects	9
Number of Distinct Detects	3	Number of Distinct Non-Detects	7
Minimum Detect	0.21	Minimum Non-Detect	0.079
Maximum Detect	0.3	Maximum Non-Detect	0.3
Variance Detects	0.00223	Percent Non-Detects	75%
Mean Detects	0.247	SD Detects	0.0473
Median Detects	0.23	CV Detects	0.192
Skewness Detects	1.39	Kurtosis Detects	N/A
Mean of Logged Detects	-1.411	SD of Logged Detects	0.185

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.907	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.304	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.128	KM Standard Error of Mean	0.0296
KM SD	0.0774	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.181	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.177	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.217	95% KM Chebyshev UCL	0.257
97.5% KM Chebyshev UCL	0.313	99% KM Chebyshev UCL	0.423

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	42.85	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00576	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	257.1	nu star (bias corrected)	N/A
Mean (detects)	0.247		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0768	Mean	0.154
Maximum	0.3	Median	0.134
SD	0.0623	CV	0.405
k hat (MLE)	7.828	k star (bias corrected MLE)	5.927
Theta hat (MLE)	0.0196	Theta star (bias corrected MLE)	0.0259
nu hat (MLE)	187.9	nu star (bias corrected)	142.2
Adjusted Level of Significance (β)	0.029		
Approximate Chi Square Value (142.24, α)	115.7	Adjusted Chi Square Value (142.24, β)	112
95% Gamma Approximate UCL (use when n>=50)	0.189	95% Gamma Adjusted UCL (use when n<50)	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.128	SD (KM)	0.0774
Variance (KM)	0.00598	SE of Mean (KM)	0.0296
k hat (KM)	2.74	k star (KM)	2.11
nu hat (KM)	65.75	nu star (KM)	50.65
theta hat (KM)	0.0467	theta star (KM)	0.0607
80% gamma percentile (KM)	0.19	90% gamma percentile (KM)	0.246
95% gamma percentile (KM)	0.299	99% gamma percentile (KM)	0.415

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (50.65, α)	35.3	Adjusted Chi Square Value (50.65, β)	33.36
95% Gamma Approximate KM-UCL (use when n>=50)	0.184	95% Gamma Adjusted KM-UCL (use when n<50)	0.194

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.926	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.29	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.17	Mean in Log Scale	-1.805
SD in Original Scale	0.0516	SD in Log Scale	0.264
95% t UCL (assumes normality of ROS data)	0.197	95% Percentile Bootstrap UCL	0.197
95% BCA Bootstrap UCL	0.204	95% Bootstrap t UCL	0.217
95% H-UCL (Log ROS)	0.198		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-2.204	KM Geo Mean	0.11
KM SD (logged)	0.514	95% Critical H Value (KM-Log)	2.159
KM Standard Error of Mean (logged)	0.2	95% H-UCL (KM -Log)	0.176
KM SD (logged)	0.514	95% Critical H Value (KM-Log)	2.159
KM Standard Error of Mean (logged)	0.2		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.137	Mean in Log Scale	-2.119
SD in Original Scale	0.0742	SD in Log Scale	0.545
95% t UCL (Assumes normality)	0.176	95% H-Stat UCL	0.2

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

95% KM (t) UCL	0.181

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (cobalt)

General Statistics

Total Number of Observations	24	Number of Distinct Observations	22
Number of Detects	23	Number of Non-Detects	1
Number of Distinct Detects	21	Number of Distinct Non-Detects	1
Minimum Detect	12	Minimum Non-Detect	3.5
Maximum Detect	200	Maximum Non-Detect	3.5
Variance Detects	1974	Percent Non-Detects	4.167%
Mean Detects	48.26	SD Detects	44.43
Median Detects	33	CV Detects	0.921
Skewness Detects	2.289	Kurtosis Detects	5.703
Mean of Logged Detects	3.592	SD of Logged Detects	0.728

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.726	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.914	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.257	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.18	Detected Data Not Normal at 5% Significance Level	

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	46.4	KM Standard Error of Mean	9.073
KM SD	43.47	95% KM (BCA) UCL	63.29
95% KM (t) UCL	61.95	95% KM (Percentile Bootstrap) UCL	62.63
95% KM (z) UCL	61.32	95% KM Bootstrap t UCL	72.94
90% KM Chebyshev UCL	73.61	95% KM Chebyshev UCL	85.94
97.5% KM Chebyshev UCL	103.1	99% KM Chebyshev UCL	136.7

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.768	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.756	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.152	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.184	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.908	k star (bias corrected MLE)	1.688
Theta hat (MLE)	25.3	Theta star (bias corrected MLE)	28.59
nu hat (MLE)	87.76	nu star (bias corrected)	77.65
Mean (detects)	48.26		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	46.25
Maximum	200	Median	31.5
SD	44.56	CV	0.963
k hat (MLE)	0.99	k star (bias corrected MLE)	0.894
Theta hat (MLE)	46.69	Theta star (bias corrected MLE)	51.71
nu hat (MLE)	47.54	nu star (bias corrected)	42.93
Adjusted Level of Significance (β)	0.0392		
Approximate Chi Square Value (42.93, α)	28.91	Adjusted Chi Square Value (42.93, β)	28.1
95% Gamma Approximate UCL (use when n>=50)	68.68	95% Gamma Adjusted UCL (use when n<50)	70.66

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	46.4	SD (KM)	43.47
Variance (KM)	1890	SE of Mean (KM)	9.073
k hat (KM)	1.139	k star (KM)	1.024
nu hat (KM)	54.68	nu star (KM)	49.17
theta hat (KM)	40.73	theta star (KM)	45.29
80% gamma percentile (KM)	74.52	90% gamma percentile (KM)	106.2
95% gamma percentile (KM)	137.8	99% gamma percentile (KM)	211.1

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (49.17, α)	34.08	Adjusted Chi Square Value (49.17, β)	33.19
95% Gamma Approximate KM-UCL (use when n>=50)	66.95	95% Gamma Adjusted KM-UCL (use when n<50)	68.74

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.959	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.914	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.107	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.18	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	46.5	Mean in Log Scale	3.517
SD in Original Scale	44.31	SD in Log Scale	0.802
95% t UCL (assumes normality of ROS data)	62	95% Percentile Bootstrap UCL	62.2
95% BCA Bootstrap UCL	66.62	95% Bootstrap t UCL	74.62
95% H-UCL (Log ROS)	68.14		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	3.495	KM Geo Mean	32.94
KM SD (logged)	0.839	95% Critical H Value (KM-Log)	2.337
KM Standard Error of Mean (logged)	0.175	95% H-UCL (KM -Log)	70.5
KM SD (logged)	0.839	95% Critical H Value (KM-Log)	2.337
KM Standard Error of Mean (logged)	0.175		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	46.32	Mean in Log Scale	3.466
SD in Original Scale	44.48	SD in Log Scale	0.943
95% t UCL (Assumes normality)	61.88	95% H-Stat UCL	81.13

DL/2 is not a recommended method, provided for comparisons and historical reasons

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	68.74	95% GROS Adjusted Gamma UCL	70.66

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test

When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (copper)

General Statistics

Total Number of Observations	24	Number of Distinct Observations	20
		Number of Missing Observations	0
Minimum	62	Mean	150
Maximum	320	Median	135
SD	66	Std. Error of Mean	13.47
Coefficient of Variation	0.44	Skewness	0.882

Normal GOF Test

Shapiro Wilk Test Statistic	0.93	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.145	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.177	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	173.1	95% Adjusted-CLT UCL (Chen-1995)	174.8
		95% Modified-t UCL (Johnson-1978)	173.5

Gamma GOF Test

A-D Test Statistic	0.283	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.746	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.131	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.178	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	5.747	k star (bias corrected MLE)	5.056
Theta hat (MLE)	26.11	Theta star (bias corrected MLE)	29.67
nu hat (MLE)	275.9	nu star (bias corrected)	242.7
MLE Mean (bias corrected)	150	MLE Sd (bias corrected)	66.73
		Approximate Chi Square Value (0.05)	207.6
Adjusted Level of Significance	0.0392	Adjusted Chi Square Value	205.4

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	175.4	95% Adjusted Gamma UCL (use when n<50)	177.3

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.978	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.112	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.177	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	4.127	Mean of logged Data	4.921
Maximum of Logged Data	5.768	SD of logged Data	0.432

Assuming Lognormal Distribution

95% H-UCL	179.2	90% Chebyshev (MVUE) UCL	191
95% Chebyshev (MVUE) UCL	209.5	97.5% Chebyshev (MVUE) UCL	235.2
99% Chebyshev (MVUE) UCL	285.8		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	172.2	95% Jackknife UCL	173.1
95% Standard Bootstrap UCL	172	95% Bootstrap-t UCL	176.2
95% Hall's Bootstrap UCL	173.7	95% Percentile Bootstrap UCL	173.6
95% BCA Bootstrap UCL	173.7		
90% Chebyshev(Mean, Sd) UCL	190.5	95% Chebyshev(Mean, Sd) UCL	208.8
97.5% Chebyshev(Mean, Sd) UCL	234.2	99% Chebyshev(Mean, Sd) UCL	284.1

Suggested UCL to Use

95% Student's-t UCL	173.1

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (cyanide)

General Statistics

Total Number of Observations	12	Number of Distinct Observations	10
Number of Detects	1	Number of Non-Detects	11
Number of Distinct Detects	1	Number of Distinct Non-Detects	9

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable result (cyanide) was not processed!

result (dieldrin)

General Statistics

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Total Number of Observations	12	Number of Distinct Observations	10
Number of Detects	1	Number of Non-Detects	11
Number of Distinct Detects	1	Number of Distinct Non-Detects	9

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable result (dieldrin) was not processed!

result (fluoranthene)

General Statistics

Total Number of Observations	12	Number of Distinct Observations	10
Number of Detects	3	Number of Non-Detects	9
Number of Distinct Detects	3	Number of Distinct Non-Detects	7
Minimum Detect	0.31	Minimum Non-Detect	0.079
Maximum Detect	0.35	Maximum Non-Detect	0.3
Variance Detects	4.0000E-4	Percent Non-Detects	75%
Mean Detects	0.33	SD Detects	0.02
Median Detects	0.33	CV Detects	0.0606
Skewness Detects	-1.27E-14	Kurtosis Detects	N/A
Mean of Logged Detects	-1.11	SD of Logged Detects	0.0607

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	1	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.175	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.142	KM Standard Error of Mean	0.0385
KM SD	0.109	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.211	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.205	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.257	95% KM Chebyshev UCL	0.31
97.5% KM Chebyshev UCL	0.382	99% KM Chebyshev UCL	0.525

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	407.8	k star (bias corrected MLE)	N/A
Theta hat (MLE)	8.0924E-4	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	2447	nu star (bias corrected)	N/A
Mean (detects)	0.33		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.207	Mean	0.262
Maximum	0.35	Median	0.24
SD	0.0438	CV	0.167
k hat (MLE)	42.49	k star (bias corrected MLE)	31.93
Theta hat (MLE)	0.00617	Theta star (bias corrected MLE)	0.00821
nu hat (MLE)	1020	nu star (bias corrected)	766.2
Adjusted Level of Significance (β)	0.029		
Approximate Chi Square Value (766.20, α)	703	Adjusted Chi Square Value (766.20, β)	693.7
95% Gamma Approximate UCL (use when n>=50)	0.286	95% Gamma Adjusted UCL (use when n<50)	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.142	SD (KM)	0.109
Variance (KM)	0.0119	SE of Mean (KM)	0.0385
k hat (KM)	1.691	k star (KM)	1.324
nu hat (KM)	40.59	nu star (KM)	31.78
theta hat (KM)	0.0838	theta star (KM)	0.107
80% gamma percentile (KM)	0.222	90% gamma percentile (KM)	0.305
95% gamma percentile (KM)	0.385	99% gamma percentile (KM)	0.569

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (31.78, α)	19.9	Adjusted Chi Square Value (31.78, β)	18.47
95% Gamma Approximate KM-UCL (use when n>=50)	0.226	95% Gamma Adjusted KM-UCL (use when n<50)	0.244

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	1	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.177	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.269	Mean in Log Scale	-1.321
SD in Original Scale	0.039	SD in Log Scale	0.136
95% t UCL (assumes normality of ROS data)	0.289	95% Percentile Bootstrap UCL	0.288
95% BCA Bootstrap UCL	0.292	95% Bootstrap t UCL	0.298
95% H-UCL (Log ROS)	0.29		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-2.181	KM Geo Mean	0.113
KM SD (logged)	0.619	95% Critical H Value (KM-Log)	2.297
KM Standard Error of Mean (logged)	0.219	95% H-UCL (KM -Log)	0.21
KM SD (logged)	0.619	95% Critical H Value (KM-Log)	2.297
KM Standard Error of Mean (logged)	0.219		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.158	Mean in Log Scale	-2.044
SD in Original Scale	0.108	SD in Log Scale	0.653

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

95% t UCL (Assumes normality)	0.214	95% H-Stat UCL	0.254

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 0.211

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (indeno (1,2,3-cd)pyrene)

General Statistics

Total Number of Observations	12	Number of Distinct Observations	9
Number of Detects	3	Number of Non-Detects	9
Number of Distinct Detects	3	Number of Distinct Non-Detects	7
Minimum Detect	0.12	Minimum Non-Detect	0.079
Maximum Detect	0.18	Maximum Non-Detect	0.3
Variance Detects	0.00103	Percent Non-Detects	75%
Mean Detects	0.157	SD Detects	0.0321
Median Detects	0.17	CV Detects	0.205
Skewness Detects	-1.545	Kurtosis Detects	N/A
Mean of Logged Detects	-1.869	SD of Logged Detects	0.219

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.871	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.328	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.125	KM Standard Error of Mean	0.0214
KM SD	0.0394	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.163	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.16	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.189	95% KM Chebyshev UCL	0.218
97.5% KM Chebyshev UCL	0.258	99% KM Chebyshev UCL	0.338

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	32.69	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00479	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	196.2	nu star (bias corrected)	N/A
Mean (detects)	0.157		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0802	Mean	0.125
Maximum	0.18	Median	0.123
SD	0.0302	CV	0.242
k hat (MLE)	19.19	k star (bias corrected MLE)	14.45
Theta hat (MLE)	0.00652	Theta star (bias corrected MLE)	0.00865
nu hat (MLE)	460.5	nu star (bias corrected)	346.7
Adjusted Level of Significance (β)	0.029		
Approximate Chi Square Value (346.71, α)	304.6	Adjusted Chi Square Value (346.71, β)	298.5
95% Gamma Approximate UCL (use when n>=50)	0.142	95% Gamma Adjusted UCL (use when n<50)	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.125	SD (KM)	0.0394
Variance (KM)	0.00156	SE of Mean (KM)	0.0214
k hat (KM)	9.993	k star (KM)	7.551
nu hat (KM)	239.8	nu star (KM)	181.2
theta hat (KM)	0.0125	theta star (KM)	0.0165
80% gamma percentile (KM)	0.16	90% gamma percentile (KM)	0.185
95% gamma percentile (KM)	0.207	99% gamma percentile (KM)	0.254

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (181.21, α)	151.1	Adjusted Chi Square Value (181.21, β)	146.9
95% Gamma Approximate KM-UCL (use when n>=50)	0.15	95% Gamma Adjusted KM-UCL (use when n<50)	0.154

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.853	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.337	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.126	Mean in Log Scale	-2.093
SD in Original Scale	0.0284	SD in Log Scale	0.217
95% t UCL (assumes normality of ROS data)	0.141	95% Percentile Bootstrap UCL	0.14
95% BCA Bootstrap UCL	0.14	95% Bootstrap t UCL	0.144
95% H-UCL (Log ROS)	0.143		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-2.134	KM Geo Mean	0.118
KM SD (logged)	0.325	95% Critical H Value (KM-Log)	1.95
KM Standard Error of Mean (logged)	0.184	95% H-UCL (KM -Log)	0.151
KM SD (logged)	0.325	95% Critical H Value (KM-Log)	1.95
KM Standard Error of Mean (logged)	0.184		

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.115	Mean in Log Scale	-2.233
SD in Original Scale	0.0396	SD in Log Scale	0.407
95% t UCL (Assumes normality)	0.135	95% H-Stat UCL	0.149

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 0.163

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (iron)

General Statistics

Total Number of Observations	24	Number of Distinct Observations	20
		Number of Missing Observations	0
Minimum	28000	Mean	65667
Maximum	150000	Median	58000
SD	28946	Std. Error of Mean	5909
Coefficient of Variation	0.441	Skewness	1.3

Normal GOF Test

Shapiro Wilk Test Statistic	0.893	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.144	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.177	Data appear Normal at 5% Significance Level	

Data appear Approximate Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	75793	95% Adjusted-CLT UCL (Chen-1995)	77061
		95% Modified-t UCL (Johnson-1978)	76055

Gamma GOF Test

A-D Test Statistic	0.374	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.746	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.129	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.178	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	6.226	k star (bias corrected MLE)	5.476
Theta hat (MLE)	10547	Theta star (bias corrected MLE)	11993
nu hat (MLE)	298.9	nu star (bias corrected)	262.8
MLE Mean (bias corrected)	65667	MLE Sd (bias corrected)	28063
		Approximate Chi Square Value (0.05)	226.3
Adjusted Level of Significance	0.0392	Adjusted Chi Square Value	223.9

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	76271	95% Adjusted Gamma UCL (use when n<50)	77082

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.98	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.114	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.177	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	10.24	Mean of logged Data	11.01
Maximum of Logged Data	11.92	SD of logged Data	0.407

Assuming Lognormal Distribution

95% H-UCL	77215	90% Chebyshev (MVUE) UCL	82218
95% Chebyshev (MVUE) UCL	89812	97.5% Chebyshev (MVUE) UCL	100352
99% Chebyshev (MVUE) UCL	121056		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	75385	95% Jackknife UCL	75793
95% Standard Bootstrap UCL	75149	95% Bootstrap-t UCL	78520
95% Hall's Bootstrap UCL	79178	95% Percentile Bootstrap UCL	75667
95% BCA Bootstrap UCL	76875		
90% Chebyshev(Mean, Sd) UCL	83393	95% Chebyshev(Mean, Sd) UCL	91422
97.5% Chebyshev(Mean, Sd) UCL	102566	99% Chebyshev(Mean, Sd) UCL	124457

Suggested UCL to Use

95% Student's-t UCL 75793

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (lead)

General Statistics

Total Number of Observations	24	Number of Distinct Observations	18
		Number of Missing Observations	0
Minimum	76	Mean	330.9
Maximum	3500	Median	170
SD	682	Std. Error of Mean	139.2

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Coefficient of Variation	2.061	Skewness	4.738

Normal GOF Test

Shapiro Wilk Test Statistic	0.329	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.401	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.177	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	569.5	95% Adjusted-CLT UCL (Chen-1995)	703.7
		95% Modified-t UCL (Johnson-1978)	591.9

Gamma GOF Test

A-D Test Statistic	2.775	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.771	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.259	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.183	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.062	k star (bias corrected MLE)	0.957
Theta hat (MLE)	311.4	Theta star (bias corrected MLE)	345.6
nu hat (MLE)	51	nu star (bias corrected)	45.96
MLE Mean (bias corrected)	330.9	MLE Sd (bias corrected)	338.2
		Approximate Chi Square Value (0.05)	31.4
Adjusted Level of Significance	0.0392	Adjusted Chi Square Value	30.56

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	484.2	95% Adjusted Gamma UCL (use when n<50)	497.6

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.817	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.138	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.177	Data appear Lognormal at 5% Significance Level	

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	4.331	Mean of logged Data	5.262
Maximum of Logged Data	8.161	SD of logged Data	0.798

Assuming Lognormal Distribution

95% H-UCL	388.4	90% Chebyshev (MVUE) UCL	400.2
95% Chebyshev (MVUE) UCL	463.4	97.5% Chebyshev (MVUE) UCL	551
99% Chebyshev (MVUE) UCL	723.1		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	559.9	95% Jackknife UCL	569.5
95% Standard Bootstrap UCL	562.5	95% Bootstrap-t UCL	1612
95% Hall's Bootstrap UCL	1505	95% Percentile Bootstrap UCL	604
95% BCA Bootstrap UCL	753.1		
90% Chebyshev(Mean, Sd) UCL	748.5	95% Chebyshev(Mean, Sd) UCL	937.7
97.5% Chebyshev(Mean, Sd) UCL	1200	99% Chebyshev(Mean, Sd) UCL	1716

Suggested UCL to Use

95% H-UCL	388.4

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

ProUCL computes and outputs H-statistic based UCLs for historical reasons only.

H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.

It is therefore recommended to avoid the use of H-statistic based 95% UCLs.

Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.

result (magnesium)

General Statistics

Total Number of Observations	24	Number of Distinct Observations	14
		Number of Missing Observations	0
Minimum	2200	Mean	10179
Maximum	16000	Median	10500
SD	2988	Std. Error of Mean	609.8
Coefficient of Variation	0.293	Skewness	-0.677

Normal GOF Test

Shapiro Wilk Test Statistic	0.963	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.122	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.177	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	11224	95% Adjusted-CLT UCL (Chen-1995)	11092
		95% Modified-t UCL (Johnson-1978)	11210

Gamma GOF Test

A-D Test Statistic	0.951	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.745	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.181	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.178	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	8.445	k star (bias corrected MLE)	7.417
Theta hat (MLE)	1205	Theta star (bias corrected MLE)	1372
nu hat (MLE)	405.4	nu star (bias corrected)	356

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

MLE Mean (bias corrected)	10179	MLE Sd (bias corrected)	3738
		Approximate Chi Square Value (0.05)	313.3
Adjusted Level of Significance	0.0392	Adjusted Chi Square Value	310.5

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	11567	95% Adjusted Gamma UCL (use when n<50)	11672

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.79	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.21	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.177	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	7.696	Mean of logged Data	9.168
Maximum of Logged Data	9.68	SD of logged Data	0.402

Assuming Lognormal Distribution

95% H-UCL	12184	90% Chebyshev (MVUE) UCL	12971
95% Chebyshev (MVUE) UCL	14157	97.5% Chebyshev (MVUE) UCL	15803
99% Chebyshev (MVUE) UCL	19036		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	11182	95% Jackknife UCL	11224
95% Standard Bootstrap UCL	11154	95% Bootstrap-t UCL	11096
95% Hall's Bootstrap UCL	11120	95% Percentile Bootstrap UCL	11154
95% BCA Bootstrap UCL	11067		
90% Chebyshev(Mean, Sd) UCL	12009	95% Chebyshev(Mean, Sd) UCL	12837
97.5% Chebyshev(Mean, Sd) UCL	13988	99% Chebyshev(Mean, Sd) UCL	16247

Suggested UCL to Use

95% Student's-t UCL 11224

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

result (manganese)

General Statistics

Total Number of Observations	24	Number of Distinct Observations	23
		Number of Missing Observations	0
Minimum	99	Mean	1397
Maximum	11000	Median	570
SD	2511	Std. Error of Mean	512.6
Coefficient of Variation	1.797	Skewness	3.045

Normal GOF Test

Shapiro Wilk Test Statistic	0.509	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.406	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.177	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	2276	95% Adjusted-CLT UCL (Chen-1995)	2581
		95% Modified-t UCL (Johnson-1978)	2329

Gamma GOF Test

A-D Test Statistic	2.234	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.783	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.27	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.185	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.745	k star (bias corrected MLE)	0.68
Theta hat (MLE)	1876	Theta star (bias corrected MLE)	2056
nu hat (MLE)	35.76	nu star (bias corrected)	32.63
MLE Mean (bias corrected)	1397	MLE Sd (bias corrected)	1695
		Approximate Chi Square Value (0.05)	20.57
Adjusted Level of Significance	0.0392	Adjusted Chi Square Value	19.9

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	2217	95% Adjusted Gamma UCL (use when n<50)	2292

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.913	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.179	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.177	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	4.595	Mean of logged Data	6.438
Maximum of Logged Data	9.306	SD of logged Data	1.143

Assuming Lognormal Distribution

95% H-UCL	2307	90% Chebyshev (MVUE) UCL	2089
95% Chebyshev (MVUE) UCL	2514	97.5% Chebyshev (MVUE) UCL	3103
99% Chebyshev (MVUE) UCL	4260		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

95% CLT UCL	2241	95% Jackknife UCL	2276
95% Standard Bootstrap UCL	2224	95% Bootstrap-t UCL	3072
95% Hall's Bootstrap UCL	2332	95% Percentile Bootstrap UCL	2296
95% BCA Bootstrap UCL	2557		
90% Chebyshev(Mean, Sd) UCL	2935	95% Chebyshev(Mean, Sd) UCL	3632
97.5% Chebyshev(Mean, Sd) UCL	4599	99% Chebyshev(Mean, Sd) UCL	6498

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL 3632

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (mercury)

General Statistics

Total Number of Observations	24	Number of Distinct Observations	20
Number of Detects	20	Number of Non-Detects	4
Number of Distinct Detects	16	Number of Distinct Non-Detects	4
Minimum Detect	0.26	Minimum Non-Detect	0.49
Maximum Detect	2.6	Maximum Non-Detect	0.64
Variance Detects	0.453	Percent Non-Detects	16.67%
Mean Detects	1.401	SD Detects	0.673
Median Detects	1.45	CV Detects	0.48
Skewness Detects	0.304	Kurtosis Detects	-0.638
Mean of Logged Detects	0.202	SD of Logged Detects	0.578

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.958	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.11	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.192	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.214	KM Standard Error of Mean	0.153
KM SD	0.731	95% KM (BCA) UCL	1.503
95% KM (t) UCL	1.477	95% KM (Percentile Bootstrap) UCL	1.482
95% KM (z) UCL	1.466	95% KM Bootstrap t UCL	1.483
90% KM Chebyshev UCL	1.674	95% KM Chebyshev UCL	1.882
97.5% KM Chebyshev UCL	2.171	99% KM Chebyshev UCL	2.739

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.288	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.746	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.12	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.195	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	3.854	k star (bias corrected MLE)	3.309
Theta hat (MLE)	0.363	Theta star (bias corrected MLE)	0.423
nu hat (MLE)	154.2	nu star (bias corrected)	132.4
Mean (detects)	1.401		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.26	Mean	1.227
Maximum	2.6	Median	1.2
SD	0.729	CV	0.594
k hat (MLE)	2.557	k star (bias corrected MLE)	2.265
Theta hat (MLE)	0.48	Theta star (bias corrected MLE)	0.542
nu hat (MLE)	122.7	nu star (bias corrected)	108.7
Adjusted Level of Significance (β)	0.0392		
Approximate Chi Square Value (108.71, α)	85.65	Adjusted Chi Square Value (108.71, β)	84.21
95% Gamma Approximate UCL (use when n>=50)	1.558	95% Gamma Adjusted UCL (use when n<50)	1.584

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.214	SD (KM)	0.731
Variance (KM)	0.535	SE of Mean (KM)	0.153
k hat (KM)	2.755	k star (KM)	2.438
nu hat (KM)	132.2	nu star (KM)	117
theta hat (KM)	0.441	theta star (KM)	0.498
80% gamma percentile (KM)	1.775	90% gamma percentile (KM)	2.255
95% gamma percentile (KM)	2.708	99% gamma percentile (KM)	3.701

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (117.04, α)	93.06	Adjusted Chi Square Value (117.04, β)	91.56
95% Gamma Approximate KM-UCL (use when n>=50)	1.527	95% Gamma Adjusted KM-UCL (use when n<50)	1.552

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.928	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.142	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.192	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	1.236	Mean in Log Scale	0.0201
SD in Original Scale	0.718	SD in Log Scale	0.67
95% t UCL (assumes normality of ROS data)	1.487	95% Percentile Bootstrap UCL	1.474
95% BCA Bootstrap UCL	1.492	95% Bootstrap t UCL	1.492
95% H-UCL (Log ROS)	1.723		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.049	KM Geo Mean	0.952
KM SD (logged)	0.765	95% Critical H Value (KM-Log)	2.251
KM Standard Error of Mean (logged)	0.161	95% H-UCL (KM -Log)	1.827
KM SD (logged)	0.765	95% Critical H Value (KM-Log)	2.251
KM Standard Error of Mean (logged)	0.161		

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	1.214	Mean in Log Scale	-0.047
SD in Original Scale	0.747	SD in Log Scale	0.775
95% t UCL (Assumes normality)	1.475	95% H-Stat UCL	1.857

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 1.477

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (naphthalene)

General Statistics

Total Number of Observations	12	Number of Distinct Observations	10
Number of Detects	1	Number of Non-Detects	11
Number of Distinct Detects	1	Number of Distinct Non-Detects	9

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable result (naphthalene) was not processed!

result (nickel)

General Statistics

Total Number of Observations	24	Number of Distinct Observations	18
		Number of Missing Observations	0
Minimum	9	Mean	73.04
Maximum	240	Median	62
SD	45.29	Std. Error of Mean	9.244
Coefficient of Variation	0.62	Skewness	2.245

Normal GOF Test

Shapiro Wilk Test Statistic	0.805	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.193	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.177	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	88.88	95% Adjusted-CLT UCL (Chen-1995)	92.77
		95% Modified-t UCL (Johnson-1978)	89.59

Gamma GOF Test

A-D Test Statistic	0.529	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.751	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.147	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.179	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.182	k star (bias corrected MLE)	2.812
Theta hat (MLE)	22.95	Theta star (bias corrected MLE)	25.97
nu hat (MLE)	152.7	nu star (bias corrected)	135
MLE Mean (bias corrected)	73.04	MLE Sd (bias corrected)	43.56
		Approximate Chi Square Value (0.05)	109.1
Adjusted Level of Significance	0.0392	Adjusted Chi Square Value	107.5

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	90.34	95% Adjusted Gamma UCL (use when n<50)	91.71

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.918	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.186	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.177	Data Not Lognormal at 5% Significance Level	

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.197	Mean of logged Data	4.126
Maximum of Logged Data	5.481	SD of logged Data	0.621

Assuming Lognormal Distribution

95% H-UCL	98.49	90% Chebyshev (MVUE) UCL	104.4
95% Chebyshev (MVUE) UCL	118	97.5% Chebyshev (MVUE) UCL	136.8
99% Chebyshev (MVUE) UCL	173.9		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	88.25	95% Jackknife UCL	88.88
95% Standard Bootstrap UCL	87.77	95% Bootstrap-t UCL	96.72
95% Hall's Bootstrap UCL	164.5	95% Percentile Bootstrap UCL	90.04
95% BCA Bootstrap UCL	93.08		
90% Chebyshev(Mean, Sd) UCL	100.8	95% Chebyshev(Mean, Sd) UCL	113.3
97.5% Chebyshev(Mean, Sd) UCL	130.8	99% Chebyshev(Mean, Sd) UCL	165

Suggested UCL to Use

95% Adjusted Gamma UCL 91.71

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (pcb-1254 (aroclor 1254))

General Statistics

Total Number of Observations	2	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	1
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: This data set only has 2 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable result (pcb-1254 (aroclor 1254)) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

result (phenanthrene)

General Statistics

Total Number of Observations	12	Number of Distinct Observations	8
Number of Detects	2	Number of Non-Detects	10
Number of Distinct Detects	2	Number of Distinct Non-Detects	8
Minimum Detect	0.17	Minimum Non-Detect	0.079
Maximum Detect	0.22	Maximum Non-Detect	0.3
Variance Detects	0.00125	Percent Non-Detects	83.33%
Mean Detects	0.195	SD Detects	0.0354
Median Detects	0.195	CV Detects	0.181
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-1.643	SD of Logged Detects	0.182

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only
Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.109	KM Standard Error of Mean	0.0265
KM SD	0.0505	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.157	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.153	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.189	95% KM Chebyshev UCL	0.225
97.5% KM Chebyshev UCL	0.275	99% KM Chebyshev UCL	0.373

Gamma GOF Tests on Detected Observations Only
Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	60.5	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00322	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	242	nu star (bias corrected)	N/A
Mean (detects)	0.195		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.109	SD (KM)	0.0505
Variance (KM)	0.00255	SE of Mean (KM)	0.0265
k hat (KM)	4.701	k star (KM)	3.581
nu hat (KM)	112.8	nu star (KM)	85.95
theta hat (KM)	0.0233	theta star (KM)	0.0306
80% gamma percentile (KM)	0.153	90% gamma percentile (KM)	0.187
95% gamma percentile (KM)	0.219	99% gamma percentile (KM)	0.286

Gamma Kaplan-Meier (KM) Statistics

		Adjusted Level of Significance (β)	0.029
Approximate Chi Square Value (85.95, α)	65.58	Adjusted Chi Square Value (85.95, β)	62.87
95% Gamma Approximate KM-UCL (use when n>=50)	0.143	95% Gamma Adjusted KM-UCL (use when n<50)	0.15

Lognormal GOF Test on Detected Observations Only
Not Enough Data to Perform GOF Test

Lognormal GOF Test on Detected Observations Only
Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.132	Mean in Log Scale	-2.052
SD in Original Scale	0.0336	SD in Log Scale	0.221
95% t UCL (assumes normality of ROS data)	0.149	95% Percentile Bootstrap UCL	0.148
95% BCA Bootstrap UCL	0.155	95% Bootstrap t UCL	0.17
95% H-UCL (Log ROS)	0.149		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-2.298	KM Geo Mean	0.1
KM SD (logged)	0.391	95% Critical H Value (KM-Log)	2.016
KM Standard Error of Mean (logged)	0.21	95% H-UCL (KM -Log)	0.138
KM SD (logged)	0.391	95% Critical H Value (KM-Log)	2.016
KM Standard Error of Mean (logged)	0.21		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.112	Mean in Log Scale	-2.294
SD in Original Scale	0.0509	SD in Log Scale	0.493
95% t UCL (Assumes normality)	0.138	95% H-Stat UCL	0.156

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.157	KM H-UCL	0.138
95% KM (BCA) UCL	N/A		

Warning: One or more Recommended UCL(s) not available!

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

result (polychlorinated biphenyls pcbs)

General Statistics

Total Number of Observations	2	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	1
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: This data set only has 2 observations!

Data set is too small to compute reliable and meaningful statistics and estimates!

The data set for variable result (polychlorinated biphenyls pcbs) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!

If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

result (potassium)

General Statistics

Total Number of Observations	24	Number of Distinct Observations	17
Number of Detects	22	Number of Non-Detects	2
Number of Distinct Detects	15	Number of Distinct Non-Detects	2
Minimum Detect	860	Minimum Non-Detect	2200
Maximum Detect	7300	Maximum Non-Detect	3100
Variance Detects	1791367	Percent Non-Detects	8.333%
Mean Detects	4494	SD Detects	1338
Median Detects	4300	CV Detects	0.298
Skewness Detects	-0.372	Kurtosis Detects	1.792
Mean of Logged Detects	8.348	SD of Logged Detects	0.418

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.943	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.911	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.148	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.184	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	4191	KM Standard Error of Mean	335.3
KM SD	1605	95% KM (BCA) UCL	4858
95% KM (t) UCL	4766	95% KM (Percentile Bootstrap) UCL	4771
95% KM (z) UCL	4742	95% KM Bootstrap t UCL	4714
90% KM Chebyshev UCL	5197	95% KM Chebyshev UCL	5653
97.5% KM Chebyshev UCL	6285	99% KM Chebyshev UCL	7527

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.986	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.745	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.17	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.186	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	8.148	k star (bias corrected MLE)	7.067
Theta hat (MLE)	551.5	Theta star (bias corrected MLE)	635.9
nu hat (MLE)	358.5	nu star (bias corrected)	310.9
Mean (detects)	4494		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	860	Mean	4311
Maximum	7300	Median	4200
SD	1421	CV	0.33
k hat (MLE)	7.138	k star (bias corrected MLE)	6.273
Theta hat (MLE)	603.9	Theta star (bias corrected MLE)	687.2
nu hat (MLE)	342.6	nu star (bias corrected)	301.1
Adjusted Level of Significance (β)	0.0392		
Approximate Chi Square Value (301.12, α)	261.9	Adjusted Chi Square Value (301.12, β)	259.4
95% Gamma Approximate UCL (use when n>=50)	4956	95% Gamma Adjusted UCL (use when n<50)	5005

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	4191	SD (KM)	1605
Variance (KM)	2576033	SE of Mean (KM)	335.3
k hat (KM)	6.818	k star (KM)	5.993
nu hat (KM)	327.3	nu star (KM)	287.7
theta hat (KM)	614.7	theta star (KM)	699.2
80% gamma percentile (KM)	5523	90% gamma percentile (KM)	6479
95% gamma percentile (KM)	7345	99% gamma percentile (KM)	9159

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (287.68, α)	249.4	Adjusted Chi Square Value (287.68, β)	246.9
95% Gamma Approximate KM-UCL (use when n>=50)	4834	95% Gamma Adjusted KM-UCL (use when n<50)	4883

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.735	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.911	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.211	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.184	Detected Data Not Lognormal at 5% Significance Level	

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	4291	Mean in Log Scale	8.288
SD in Original Scale	1452	SD in Log Scale	0.448
95% t UCL (assumes normality of ROS data)	4799	95% Percentile Bootstrap UCL	4766
95% BCA Bootstrap UCL	4763	95% Bootstrap t UCL	4803
95% H-UCL (Log ROS)	5265		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	8.215	KM Geo Mean	3697
KM SD (logged)	0.588	95% Critical H Value (KM-Log)	2.062
KM Standard Error of Mean (logged)	0.123	95% H-UCL (KM -Log)	5660
KM SD (logged)	0.588	95% Critical H Value (KM-Log)	2.062
KM Standard Error of Mean (logged)	0.123		

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	4230	Mean in Log Scale	8.25
SD in Original Scale	1562	SD in Log Scale	0.521
95% t UCL (Assumes normality)	4776	95% H-Stat UCL	5448

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 4766

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (pyrene)

General Statistics

Total Number of Observations	12	Number of Distinct Observations	9
Number of Detects	3	Number of Non-Detects	9
Number of Distinct Detects	3	Number of Distinct Non-Detects	7
Minimum Detect	0.28	Minimum Non-Detect	0.079
Maximum Detect	0.59	Maximum Non-Detect	0.3
Variance Detects	0.0301	Percent Non-Detects	75%
Mean Detects	0.39	SD Detects	0.173
Median Detects	0.3	CV Detects	0.445
Skewness Detects	1.706	Kurtosis Detects	N/A
Mean of Logged Detects	-1.002	SD of Logged Detects	0.412

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.798	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.365	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.159	KM Standard Error of Mean	0.0543
KM SD	0.152	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.256	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.248	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.322	95% KM Chebyshev UCL	0.395
97.5% KM Chebyshev UCL	0.498	99% KM Chebyshev UCL	0.699

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	8.508	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0458	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	51.05	nu star (bias corrected)	N/A
Mean (detects)	0.39		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.106
Maximum	0.59	Median	0.01
SD	0.187	CV	1.769
k hat (MLE)	0.456	k star (bias corrected MLE)	0.398
Theta hat (MLE)	0.231	Theta star (bias corrected MLE)	0.265
nu hat (MLE)	10.95	nu star (bias corrected)	9.548
Adjusted Level of Significance (β)	0.029		
Approximate Chi Square Value (9.55, α)	3.662	Adjusted Chi Square Value (9.55, β)	3.126
95% Gamma Approximate UCL (use when n>=50)	0.275	95% Gamma Adjusted UCL (use when n<50)	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.159	SD (KM)	0.152
Variance (KM)	0.0232	SE of Mean (KM)	0.0543
k hat (KM)	1.083	k star (KM)	0.868
nu hat (KM)	25.99	nu star (KM)	20.82
theta hat (KM)	0.146	theta star (KM)	0.183
80% gamma percentile (KM)	0.258	90% gamma percentile (KM)	0.378
95% gamma percentile (KM)	0.5	99% gamma percentile (KM)	0.785

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (20.82, α)	11.46	Adjusted Chi Square Value (20.82, β)	10.42
95% Gamma Approximate KM-UCL (use when n>=50)	0.288	95% Gamma Adjusted KM-UCL (use when n<50)	0.317

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.819	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.355	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.167	Mean in Log Scale	-2.055
SD in Original Scale	0.155	SD in Log Scale	0.691
95% t UCL (assumes normality of ROS data)	0.247	95% Percentile Bootstrap UCL	0.242
95% BCA Bootstrap UCL	0.269	95% Bootstrap t UCL	0.327
95% H-UCL (Log ROS)	0.268		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-2.142	KM Geo Mean	0.117

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

KM SD (logged)	0.69	95% Critical H Value (KM-Log)	2.4
KM Standard Error of Mean (logged)	0.248	95% H-UCL (KM -Log)	0.246
KM SD (logged)	0.69	95% Critical H Value (KM-Log)	2.4
KM Standard Error of Mean (logged)	0.248		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.173	Mean in Log Scale	-2.016
SD in Original Scale	0.153	SD in Log Scale	0.717
95% t UCL (Assumes normality)	0.252	95% H-Stat UCL	0.292

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.256

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (selenium)

General Statistics

Total Number of Observations	24	Number of Distinct Observations	17
Number of Detects	16	Number of Non-Detects	8
Number of Distinct Detects	11	Number of Distinct Non-Detects	7
Minimum Detect	7.1	Minimum Non-Detect	2.8
Maximum Detect	26	Maximum Non-Detect	17
Variance Detects	26.73	Percent Non-Detects	33.33%
Mean Detects	14.36	SD Detects	5.17
Median Detects	16	CV Detects	0.36
Skewness Detects	0.333	Kurtosis Detects	0.0938
Mean of Logged Detects	2.599	SD of Logged Detects	0.384

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.919	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.187	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.213	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	11.42	KM Standard Error of Mean	1.36
KM SD	6.184	95% KM (BCA) UCL	14.09
95% KM (t) UCL	13.75	95% KM (Percentile Bootstrap) UCL	13.69
95% KM (z) UCL	13.65	95% KM Bootstrap t UCL	13.59
90% KM Chebyshev UCL	15.5	95% KM Chebyshev UCL	17.34
97.5% KM Chebyshev UCL	19.91	99% KM Chebyshev UCL	24.95

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.694	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.74	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.227	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.215	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	7.788	k star (bias corrected MLE)	6.37
Theta hat (MLE)	1.844	Theta star (bias corrected MLE)	2.255
nu hat (MLE)	249.2	nu star (bias corrected)	203.8
Mean (detects)	14.36		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	4.636	Mean	11.88
Maximum	26	Median	9.782
SD	5.631	CV	0.474
k hat (MLE)	4.613	k star (bias corrected MLE)	4.064
Theta hat (MLE)	2.574	Theta star (bias corrected MLE)	2.922
nu hat (MLE)	221.4	nu star (bias corrected)	195.1
Adjusted Level of Significance (β)	0.0392		
Approximate Chi Square Value (195.09, α)	163.8	Adjusted Chi Square Value (195.09, β)	161.8
95% Gamma Approximate UCL (use when n>=50)	14.15	95% Gamma Adjusted UCL (use when n<50)	14.32

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	11.42	SD (KM)	6.184
Variance (KM)	38.24	SE of Mean (KM)	1.36
k hat (KM)	3.408	k star (KM)	3.01
nu hat (KM)	163.6	nu star (KM)	144.5
theta hat (KM)	3.35	theta star (KM)	3.793
80% gamma percentile (KM)	16.28	90% gamma percentile (KM)	20.24
95% gamma percentile (KM)	23.93	99% gamma percentile (KM)	31.95

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (144.47, α)	117.7	Adjusted Chi Square Value (144.47, β)	116
95% Gamma Approximate KM-UCL (use when n>=50)	14.01	95% Gamma Adjusted KM-UCL (use when n<50)	14.22

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.91	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.237	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.213	Detected Data Not Lognormal at 5% Significance Level	

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	12.01	Mean in Log Scale	2.389
SD in Original Scale	5.454	SD in Log Scale	0.451
95% t UCL (assumes normality of ROS data)	13.92	95% Percentile Bootstrap UCL	13.89
95% BCA Bootstrap UCL	14.17	95% Bootstrap t UCL	14.15

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

95% H-UCL (Log ROS)	14.48

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.24	KM Geo Mean	9.394
KM SD (logged)	0.684	95% Critical H Value (KM-Log)	2.161
KM Standard Error of Mean (logged)	0.159	95% H-UCL (KM -Log)	16.16
KM SD (logged)	0.684	95% Critical H Value (KM-Log)	2.161
KM Standard Error of Mean (logged)	0.159		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	11.23	Mean in Log Scale	2.222
SD in Original Scale	6.297	SD in Log Scale	0.71
95% t UCL (Assumes normality)	13.43	95% H-Stat UCL	16.41

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	13.75

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (silver)

General Statistics

Total Number of Observations	24	Number of Distinct Observations	15
Number of Detects	11	Number of Non-Detects	13
Number of Distinct Detects	10	Number of Distinct Non-Detects	7
Minimum Detect	0.31	Minimum Non-Detect	0.61
Maximum Detect	4.4	Maximum Non-Detect	1.7
Variance Detects	1.14	Percent Non-Detects	54.17%
Mean Detects	1.681	SD Detects	1.068
Median Detects	1.5	CV Detects	0.635
Skewness Detects	1.739	Kurtosis Detects	4.182
Mean of Logged Detects	0.342	SD of Logged Detects	0.66

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.846	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.22	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.251	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.026	KM Standard Error of Mean	0.211
KM SD	0.944	95% KM (BCA) UCL	1.544
95% KM (t) UCL	1.388	95% KM (Percentile Bootstrap) UCL	1.425
95% KM (z) UCL	1.374	95% KM Bootstrap t UCL	1.454
90% KM Chebyshev UCL	1.66	95% KM Chebyshev UCL	1.947
97.5% KM Chebyshev UCL	2.346	99% KM Chebyshev UCL	3.13

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.355	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.734	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.167	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.257	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	2.971	k star (bias corrected MLE)	2.221
Theta hat (MLE)	0.566	Theta star (bias corrected MLE)	0.757
nu hat (MLE)	65.36	nu star (bias corrected)	48.87
Mean (detects)	1.681		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.904
Maximum	4.4	Median	0.528
SD	1.035	CV	1.145
k hat (MLE)	0.545	k star (bias corrected MLE)	0.505
Theta hat (MLE)	1.657	Theta star (bias corrected MLE)	1.79
nu hat (MLE)	26.17	nu star (bias corrected)	24.23
Adjusted Level of Significance (β)	0.0392		
Approximate Chi Square Value (24.23, α)	14.02	Adjusted Chi Square Value (24.23, β)	13.48
95% Gamma Approximate UCL (use when n>=50)	1.561	95% Gamma Adjusted UCL (use when n<50)	1.624

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.026	SD (KM)	0.944
Variance (KM)	0.892	SE of Mean (KM)	0.211
k hat (KM)	1.18	k star (KM)	1.06
nu hat (KM)	56.64	nu star (KM)	50.89
theta hat (KM)	0.869	theta star (KM)	0.967
80% gamma percentile (KM)	1.643	90% gamma percentile (KM)	2.328
95% gamma percentile (KM)	3.01	99% gamma percentile (KM)	4.587

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (50.89, α)	35.51	Adjusted Chi Square Value (50.89, β)	34.61
95% Gamma Approximate KM-UCL (use when n>=50)	1.47	95% Gamma Adjusted KM-UCL (use when n<50)	1.509

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.925	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.201	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.251	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Mean in Original Scale	1.035	Mean in Log Scale	-0.263
SD in Original Scale	0.938	SD in Log Scale	0.759
95% t UCL (assumes normality of ROS data)	1.363	95% Percentile Bootstrap UCL	1.357
95% BCA Bootstrap UCL	1.472	95% Bootstrap t UCL	1.571
95% H-UCL (Log ROS)	1.463		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.336	KM Geo Mean	0.715
KM SD (logged)	0.842	95% Critical H Value (KM-Log)	2.341
KM Standard Error of Mean (logged)	0.207	95% H-UCL (KM -Log)	1.536
KM SD (logged)	0.842	95% Critical H Value (KM-Log)	2.341
KM Standard Error of Mean (logged)	0.207		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.062	Mean in Log Scale	-0.198
SD in Original Scale	0.919	SD in Log Scale	0.699
95% t UCL (Assumes normality)	1.384	95% H-Stat UCL	1.438

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	1.388

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test

When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (sodium)

General Statistics

Total Number of Observations	24	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	2000	Mean	32192
Maximum	67000	Median	30000
SD	16650	Std. Error of Mean	3399
Coefficient of Variation	0.517	Skewness	0.335

Normal GOF Test

Shapiro Wilk Test Statistic	0.972	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.118	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.177	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	38016	95% Adjusted-CLT UCL (Chen-1995)	38030
		95% Modified-t UCL (Johnson-1978)	38055

Gamma GOF Test

A-D Test Statistic	0.349	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.752	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.103	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.179	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.825	k star (bias corrected MLE)	2.5
Theta hat (MLE)	11396	Theta star (bias corrected MLE)	12879
nu hat (MLE)	135.6	nu star (bias corrected)	120
MLE Mean (bias corrected)	32192	MLE Sd (bias corrected)	20361
		Approximate Chi Square Value (0.05)	95.69
Adjusted Level of Significance	0.0392	Adjusted Chi Square Value	94.16

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	40365	95% Adjusted Gamma UCL (use when n<50)	41018

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.846	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.151	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.177	Data appear Lognormal at 5% Significance Level	

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	7.601	Mean of logged Data	10.19
Maximum of Logged Data	11.11	SD of logged Data	0.742

Assuming Lognormal Distribution

95% H-UCL	49606	90% Chebyshev (MVUE) UCL	51708
95% Chebyshev (MVUE) UCL	59430	97.5% Chebyshev (MVUE) UCL	70147
99% Chebyshev (MVUE) UCL	91198		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	37782	95% Jackknife UCL	38016
95% Standard Bootstrap UCL	37747	95% Bootstrap-t UCL	38234
95% Hall's Bootstrap UCL	38188	95% Percentile Bootstrap UCL	37833
95% BCA Bootstrap UCL	37750		
90% Chebyshev(Mean, Sd) UCL	42387	95% Chebyshev(Mean, Sd) UCL	47006
97.5% Chebyshev(Mean, Sd) UCL	53416	99% Chebyshev(Mean, Sd) UCL	66007

Suggested UCL to Use

95% Student's-t UCL	38016

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (thallium)

General Statistics

Total Number of Observations	24	Number of Distinct Observations	15
Number of Detects	1	Number of Non-Detects	23
Number of Distinct Detects	1	Number of Distinct Non-Detects	14

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable result (thallium) was not processed!

result (total organic carbon)

General Statistics

Total Number of Observations	12	Number of Distinct Observations	12
		Number of Missing Observations	0
Minimum	40000	Mean	161000
Maximum	360000	Median	145000
SD	106938	Std. Error of Mean	30870
Coefficient of Variation	0.664	Skewness	0.514

Normal GOF Test

Shapiro Wilk Test Statistic	0.92	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.163	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.243	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	216440	95% Adjusted-CLT UCL (Chen-1995)	216672
		95% Modified-t UCL (Johnson-1978)	217203

Gamma GOF Test

A-D Test Statistic	0.402	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.741	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.18	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.248	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.157	k star (bias corrected MLE)	1.673
Theta hat (MLE)	74652	Theta star (bias corrected MLE)	96231
nu hat (MLE)	51.76	nu star (bias corrected)	40.15
MLE Mean (bias corrected)	161000	MLE Sd (bias corrected)	124472
		Approximate Chi Square Value (0.05)	26.63
Adjusted Level of Significance	0.029	Adjusted Chi Square Value	24.96

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	242720	95% Adjusted Gamma UCL (use when n<50)	258961

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.905	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.185	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.243	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	10.6	Mean of logged Data	11.74
Maximum of Logged Data	12.79	SD of logged Data	0.786

Assuming Lognormal Distribution

95% H-UCL	312269	90% Chebyshev (MVUE) UCL	283753
95% Chebyshev (MVUE) UCL	337315	97.5% Chebyshev (MVUE) UCL	411655
99% Chebyshev (MVUE) UCL	557683		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	211777	95% Jackknife UCL	216440
95% Standard Bootstrap UCL	210384	95% Bootstrap-t UCL	222078
95% Hall's Bootstrap UCL	214717	95% Percentile Bootstrap UCL	210167
95% BCA Bootstrap UCL	211583		
90% Chebyshev(Mean, Sd) UCL	253611	95% Chebyshev(Mean, Sd) UCL	295561
97.5% Chebyshev(Mean, Sd) UCL	353786	99% Chebyshev(Mean, Sd) UCL	468157

Suggested UCL to Use

95% Student's-t UCL	216440

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (vanadium)

General Statistics

Total Number of Observations	24	Number of Distinct Observations	19
Number of Detects	21	Number of Non-Detects	3
Number of Distinct Detects	17	Number of Distinct Non-Detects	3
Minimum Detect	53	Minimum Non-Detect	67
Maximum Detect	190	Maximum Non-Detect	83
Variance Detects	1377	Percent Non-Detects	12.5%
Mean Detects	100.3	SD Detects	37.11
Median Detects	96	CV Detects	0.37
Skewness Detects	0.741	Kurtosis Detects	0.0499
Mean of Logged Detects	4.545	SD of Logged Detects	0.364

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.94	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.111	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.188	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	95.58	KM Standard Error of Mean	7.596
KM SD	36.22	95% KM (BCA) UCL	108.3
95% KM (t) UCL	108.6	95% KM (Percentile Bootstrap) UCL	108.7
95% KM (z) UCL	108.1	95% KM Bootstrap t UCL	110.6
90% KM Chebyshev UCL	118.4	95% KM Chebyshev UCL	128.7
97.5% KM Chebyshev UCL	143	99% KM Chebyshev UCL	171.2

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.27	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.744	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.115	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.19	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	8.056	k star (bias corrected MLE)	6.937
Theta hat (MLE)	12.45	Theta star (bias corrected MLE)	14.46
nu hat (MLE)	338.4	nu star (bias corrected)	291.4
Mean (detects)	100.3		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	53	Mean	95.39
Maximum	190	Median	87
SD	37.12	CV	0.389
k hat (MLE)	7.538	k star (bias corrected MLE)	6.623
Theta hat (MLE)	12.65	Theta star (bias corrected MLE)	14.4
nu hat (MLE)	361.8	nu star (bias corrected)	317.9
Adjusted Level of Significance (β)	0.0392		
Approximate Chi Square Value (317.92, α)	277.6	Adjusted Chi Square Value (317.92, β)	275
95% Gamma Approximate UCL (use when n>=50)	109.2	95% Gamma Adjusted UCL (use when n<50)	110.3

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	95.58	SD (KM)	36.22
Variance (KM)	1312	SE of Mean (KM)	7.596
k hat (KM)	6.965	k star (KM)	6.122
nu hat (KM)	334.3	nu star (KM)	293.9
theta hat (KM)	13.72	theta star (KM)	15.61
80% gamma percentile (KM)	125.7	90% gamma percentile (KM)	147.2
95% gamma percentile (KM)	166.7	99% gamma percentile (KM)	207.5

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (293.86, α)	255.1	Adjusted Chi Square Value (293.86, β)	252.6
95% Gamma Approximate KM-UCL (use when n>=50)	110.1	95% Gamma Adjusted KM-UCL (use when n<50)	111.2

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.97	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.111	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.188	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	95.7	Mean in Log Scale	4.495
SD in Original Scale	36.81	SD in Log Scale	0.366
95% t UCL (assumes normality of ROS data)	108.6	95% Percentile Bootstrap UCL	107.7
95% BCA Bootstrap UCL	109	95% Bootstrap t UCL	111.2
95% H-UCL (Log ROS)	110.5		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	4.493	KM Geo Mean	89.37
KM SD (logged)	0.362	95% Critical H Value (KM-Log)	1.869
KM Standard Error of Mean (logged)	0.0763	95% H-UCL (KM -Log)	109.9
KM SD (logged)	0.362	95% Critical H Value (KM-Log)	1.869
KM Standard Error of Mean (logged)	0.0763		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	92.52	Mean in Log Scale	4.431
SD in Original Scale	40.56	SD in Log Scale	0.461
95% t UCL (Assumes normality)	106.7	95% H-Stat UCL	112.6

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	108.6

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (zinc)

General Statistics

Total Number of Observations	24	Number of Distinct Observations	21
		Number of Missing Observations	0
Minimum	80	Mean	467.1
Maximum	1300	Median	475
SD	270	Std. Error of Mean	55.1

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Coefficient of Variation	0.578	Skewness	1.414

Normal GOF Test

Shapiro Wilk Test Statistic	0.889	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.171	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.177	Data appear Normal at 5% Significance Level	

Data appear Approximate Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	561.5	95% Adjusted-CLT UCL (Chen-1995)	574.7
		95% Modified-t UCL (Johnson-1978)	564.2

Gamma GOF Test

A-D Test Statistic	0.33	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.751	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.12	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.179	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.23	k star (bias corrected MLE)	2.854
Theta hat (MLE)	144.6	Theta star (bias corrected MLE)	163.6
nu hat (MLE)	155.1	nu star (bias corrected)	137
MLE Mean (bias corrected)	467.1	MLE Sd (bias corrected)	276.5
		Approximate Chi Square Value (0.05)	111
Adjusted Level of Significance	0.0392	Adjusted Chi Square Value	109.3

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	576.7	95% Adjusted Gamma UCL (use when n<50)	585.4

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.96	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.916	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.15	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.177	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	4.382	Mean of logged Data	5.984
Maximum of Logged Data	7.17	SD of logged Data	0.614

Assuming Lognormal Distribution

95% H-UCL	625.8	90% Chebyshev (MVUE) UCL	663.6
95% Chebyshev (MVUE) UCL	749.2	97.5% Chebyshev (MVUE) UCL	867.9
99% Chebyshev (MVUE) UCL	1101		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	557.7	95% Jackknife UCL	561.5
95% Standard Bootstrap UCL	555.7	95% Bootstrap-t UCL	588.1
95% Hall's Bootstrap UCL	619.3	95% Percentile Bootstrap UCL	555.8
95% BCA Bootstrap UCL	575		
90% Chebyshev(Mean, Sd) UCL	632.4	95% Chebyshev(Mean, Sd) UCL	707.3
97.5% Chebyshev(Mean, Sd) UCL	811.2	99% Chebyshev(Mean, Sd) UCL	1015

Suggested UCL to Use

95% Student's-t UCL	561.5

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test

When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (1,2,3,4,6,7,8,9-octachlorodibenzofuran)

result (1,2,3,4,6,7,8,9-octachlorodibenzofuran)

General Statistics

Total Number of Observations	16	Number of Distinct Observations	12
Number of Detects	15	Number of Non-Detects	1
Number of Distinct Detects	11	Number of Distinct Non-Detects	1
Minimum Detect	37	Minimum Non-Detect	35
Maximum Detect	1100	Maximum Non-Detect	35
Variance Detects	72605	Percent Non-Detects	6.25%
Mean Detects	196.6	SD Detects	269.5
Median Detects	130	CV Detects	1.371
Skewness Detects	3.111	Kurtosis Detects	10.27
Mean of Logged Detects	4.814	SD of Logged Detects	0.902

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.54	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.881	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.406	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.22	Detected Data Not Normal at 5% Significance Level	

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	186.5	KM Standard Error of Mean	66
KM SD	255.1	95% KM (BCA) UCL	305.8
95% KM (t) UCL	302.2	95% KM (Percentile Bootstrap) UCL	306.2
95% KM (z) UCL	295.1	95% KM Bootstrap t UCL	674.2
90% KM Chebyshev UCL	384.5	95% KM Chebyshev UCL	474.2
97.5% KM Chebyshev UCL	598.7	99% KM Chebyshev UCL	843.2

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.41	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.759	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.306	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.227	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Gamma Statistics on Detected Data Only

k hat (MLE)	1.211	k star (bias corrected MLE)	1.013
Theta hat (MLE)	162.4	Theta star (bias corrected MLE)	194.1
nu hat (MLE)	36.32	nu star (bias corrected)	30.39
Mean (detects)	196.6		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	184.3
Maximum	1100	Median	130
SD	264.9	CV	1.437
k hat (MLE)	0.62	k star (bias corrected MLE)	0.546
Theta hat (MLE)	297.1	Theta star (bias corrected MLE)	337.7
nu hat (MLE)	19.85	nu star (bias corrected)	17.46
Adjusted Level of Significance (β)	0.0335		
Approximate Chi Square Value (17.46, α)	9.005	Adjusted Chi Square Value (17.46, β)	8.32
95% Gamma Approximate UCL (use when n>=50)	357.5	95% Gamma Adjusted UCL (use when n<50)	386.9

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	186.5	SD (KM)	255.1
Variance (KM)	65059	SE of Mean (KM)	66
k hat (KM)	0.535	k star (KM)	0.476
nu hat (KM)	17.11	nu star (KM)	15.23
theta hat (KM)	348.8	theta star (KM)	391.8
80% gamma percentile (KM)	305.5	90% gamma percentile (KM)	509.7
95% gamma percentile (KM)	729	99% gamma percentile (KM)	1271

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (15.23, α)	7.424	Adjusted Chi Square Value (15.23, β)	6.811
95% Gamma Approximate KM-UCL (use when n>=50)	382.7	95% Gamma Adjusted KM-UCL (use when n<50)	417.1

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.866	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.881	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.227	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.22	Detected Data Not Lognormal at 5% Significance Level	

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	185.3	Mean in Log Scale	4.684
SD in Original Scale	264.2	SD in Log Scale	1.015
95% t UCL (assumes normality of ROS data)	301.1	95% Percentile Bootstrap UCL	303.9
95% BCA Bootstrap UCL	346.6	95% Bootstrap t UCL	656.6
95% H-UCL (Log ROS)	370.2		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	4.736	KM Geo Mean	113.9
KM SD (logged)	0.897	95% Critical H Value (KM-Log)	2.55
KM Standard Error of Mean (logged)	0.232	95% H-UCL (KM -Log)	307.6
KM SD (logged)	0.897	95% Critical H Value (KM-Log)	2.55
KM Standard Error of Mean (logged)	0.232		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	185.4	Mean in Log Scale	4.692
SD in Original Scale	264.1	SD in Log Scale	0.999
95% t UCL (Assumes normality)	301.2	95% H-Stat UCL	360.7

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL	474.2

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (1,2,3,4,6,7,8,9-octachlorodibenzo-p-dioxin)

General Statistics

Total Number of Observations	16	Number of Distinct Observations	14
		Number of Missing Observations	0
Minimum	1400	Mean	8463
Maximum	22000	Median	8100
SD	5556	Std. Error of Mean	1389
Coefficient of Variation	0.657	Skewness	0.877

Normal GOF Test

Shapiro Wilk Test Statistic	0.932	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.137	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.213	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	10897	95% Adjusted-CLT UCL (Chen-1995)	11072
		95% Modified-t UCL (Johnson-1978)	10948

Gamma GOF Test

A-D Test Statistic	0.253	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.749	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.111	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.218	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.236	k star (bias corrected MLE)	1.858

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Theta hat (MLE)	3785	Theta star (bias corrected MLE)	4554
nu hat (MLE)	71.54	nu star (bias corrected)	59.46
MLE Mean (bias corrected)	8463	MLE Sd (bias corrected)	6208
		Approximate Chi Square Value (0.05)	42.73
Adjusted Level of Significance	0.0335	Adjusted Chi Square Value	41.12

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	11776	95% Adjusted Gamma UCL (use when n<50)	12238

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.953	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.137	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.213	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	7.244	Mean of logged Data	8.803
Maximum of Logged Data	9.999	SD of logged Data	0.77

Assuming Lognormal Distribution

95% H-UCL	14352	90% Chebyshev (MVUE) UCL	14146
95% Chebyshev (MVUE) UCL	16589	97.5% Chebyshev (MVUE) UCL	19980
99% Chebyshev (MVUE) UCL	26641		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	10747	95% Jackknife UCL	10897
95% Standard Bootstrap UCL	10681	95% Bootstrap-t UCL	11285
95% Hall's Bootstrap UCL	11602	95% Percentile Bootstrap UCL	10838
95% BCA Bootstrap UCL	11006		
90% Chebyshev(Mean, Sd) UCL	12629	95% Chebyshev(Mean, Sd) UCL	14517
97.5% Chebyshev(Mean, Sd) UCL	17136	99% Chebyshev(Mean, Sd) UCL	22282

Suggested UCL to Use

95% Student's-t UCL 10897

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (1,2,3,4,6,7,8-heptachlorodibenzofuran)

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
Number of Detects	15	Number of Non-Detects	1
Number of Distinct Detects	15	Number of Distinct Non-Detects	1
Minimum Detect	26	Minimum Non-Detect	18
Maximum Detect	2400	Maximum Non-Detect	18
Variance Detects	360919	Percent Non-Detects	6.25%
Mean Detects	238.7	SD Detects	600.8
Median Detects	83	CV Detects	2.517
Skewness Detects	3.812	Kurtosis Detects	14.65
Mean of Logged Detects	4.473	SD of Logged Detects	1.112

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.355	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.881	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.451	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.22	Detected Data Not Normal at 5% Significance Level	

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	224.9	KM Standard Error of Mean	146.1
KM SD	564.5	95% KM (BCA) UCL	515.9
95% KM (t) UCL	481	95% KM (Percentile Bootstrap) UCL	512.2
95% KM (z) UCL	465.2	95% KM Bootstrap t UCL	3279
90% KM Chebyshev UCL	663.1	95% KM Chebyshev UCL	861.6
97.5% KM Chebyshev UCL	1137	99% KM Chebyshev UCL	1678

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	2.576	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.785	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.403	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.232	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.614	k star (bias corrected MLE)	0.536
Theta hat (MLE)	388.5	Theta star (bias corrected MLE)	445.3
nu hat (MLE)	18.43	nu star (bias corrected)	16.08
Mean (detects)	238.7		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	223.8
Maximum	2400	Median	81.5
SD	583.5	CV	2.608
k hat (MLE)	0.432	k star (bias corrected MLE)	0.393
Theta hat (MLE)	518.1	Theta star (bias corrected MLE)	570
nu hat (MLE)	13.82	nu star (bias corrected)	12.56
Adjusted Level of Significance (β)	0.0335		
Approximate Chi Square Value (12.56, α)	5.6	Adjusted Chi Square Value (12.56, β)	5.079
95% Gamma Approximate UCL (use when n>=50)	502	95% Gamma Adjusted UCL (use when n<50)	553.4

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	224.9	SD (KM)	564.5
Variance (KM)	318658	SE of Mean (KM)	146.1
k hat (KM)	0.159	k star (KM)	0.171

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

nu hat (KM)	5.078	nu star (KM)	5.459
theta hat (KM)	1417	theta star (KM)	1318
80% gamma percentile (KM)	269.5	90% gamma percentile (KM)	675.9
95% gamma percentile (KM)	1205	99% gamma percentile (KM)	2701

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (5.46, α)	1.37	Adjusted Chi Square Value (5.46, β)	1.153
95% Gamma Approximate KM-UCL (use when n>=50)	896	95% Gamma Adjusted KM-UCL (use when n<50)	1065

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.775	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.881	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.286	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.22	Detected Data Not Lognormal at 5% Significance Level	

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	224.2	Mean in Log Scale	4.322
SD in Original Scale	583.3	SD in Log Scale	1.232
95% t UCL (assumes normality of ROS data)	479.9	95% Percentile Bootstrap UCL	509
95% BCA Bootstrap UCL	674.4	95% Bootstrap t UCL	3166
95% H-UCL (Log ROS)	428.1		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	4.374	KM Geo Mean	79.36
KM SD (logged)	1.108	95% Critical H Value (KM-Log)	2.874
KM Standard Error of Mean (logged)	0.287	95% H-UCL (KM -Log)	333.8
KM SD (logged)	1.108	95% Critical H Value (KM-Log)	2.874
KM Standard Error of Mean (logged)	0.287		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	224.3	Mean in Log Scale	4.331
SD in Original Scale	583.2	SD in Log Scale	1.215
95% t UCL (Assumes normality)	479.9	95% H-Stat UCL	414.2

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL	861.6

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin)

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	0
Minimum	60	Mean	375.3
Maximum	1800	Median	305
SD	415.4	Std. Error of Mean	103.9
Coefficient of Variation	1.107	Skewness	2.978

Normal GOF Test

Shapiro Wilk Test Statistic	0.642	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.304	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.213	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	557.3	95% Adjusted-CLT UCL (Chen-1995)	628.7
		95% Modified-t UCL (Johnson-1978)	570.2

Gamma GOF Test

A-D Test Statistic	0.539	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.755	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.183	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.219	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.478	k star (bias corrected MLE)	1.242
Theta hat (MLE)	253.9	Theta star (bias corrected MLE)	302
nu hat (MLE)	47.29	nu star (bias corrected)	39.76
MLE Mean (bias corrected)	375.3	MLE Sd (bias corrected)	336.6
		Approximate Chi Square Value (0.05)	26.31
Adjusted Level of Significance	0.0335	Adjusted Chi Square Value	25.07

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	567	95% Adjusted Gamma UCL (use when n<50)	595.1

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.96	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.146	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.213	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	4.094	Mean of logged Data	5.553
Maximum of Logged Data	7.496	SD of logged Data	0.865

Assuming Lognormal Distribution

95% H-UCL	655.6	90% Chebyshev (MVUE) UCL	618.5
95% Chebyshev (MVUE) UCL	733.9	97.5% Chebyshev (MVUE) UCL	894.1
99% Chebyshev (MVUE) UCL	1209		

Nonparametric Distribution Free UCL Statistics

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	546.1	95% Jackknife UCL	557.3
95% Standard Bootstrap UCL	538.5	95% Bootstrap-t UCL	792.8
95% Hall's Bootstrap UCL	1295	95% Percentile Bootstrap UCL	555.9
95% BCA Bootstrap UCL	651.3		
90% Chebyshev(Mean, Sd) UCL	686.8	95% Chebyshev(Mean, Sd) UCL	827.9
97.5% Chebyshev(Mean, Sd) UCL	1024	99% Chebyshev(Mean, Sd) UCL	1409

Suggested UCL to Use

95% Adjusted Gamma UCL 595.1

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (1,2,3,4,7,8,9-heptachlorodibenzofuran)

General Statistics

Total Number of Observations	16	Number of Distinct Observations	14
Number of Detects	2	Number of Non-Detects	14
Number of Distinct Detects	2	Number of Distinct Non-Detects	12
Minimum Detect	12	Minimum Non-Detect	6
Maximum Detect	37	Maximum Non-Detect	20
Variance Detects	312.5	Percent Non-Detects	87.5%
Mean Detects	24.5	SD Detects	17.68
Median Detects	24.5	CV Detects	0.722
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	3.048	SD of Logged Detects	0.796

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	8.875	KM Standard Error of Mean	2.838
KM SD	7.578	95% KM (BCA) UCL	N/A
95% KM (t) UCL	13.85	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	13.54	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	17.39	95% KM Chebyshev UCL	21.25
97.5% KM Chebyshev UCL	26.6	99% KM Chebyshev UCL	37.12

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	3.474	k star (bias corrected MLE)	N/A
Theta hat (MLE)	7.052	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	13.9	nu star (bias corrected)	N/A
Mean (detects)	24.5		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	8.875	SD (KM)	7.578
Variance (KM)	57.42	SE of Mean (KM)	2.838
k hat (KM)	1.372	k star (KM)	1.156
nu hat (KM)	43.89	nu star (KM)	37
theta hat (KM)	6.47	theta star (KM)	7.676
80% gamma percentile (KM)	14.1	90% gamma percentile (KM)	19.72
95% gamma percentile (KM)	25.27	99% gamma percentile (KM)	38.03

Gamma Kaplan-Meier (KM) Statistics

		Adjusted Level of Significance (β)	0.0335
Approximate Chi Square Value (37.00, α)	24.07	Adjusted Chi Square Value (37.00, β)	22.89
95% Gamma Approximate KM-UCL (use when n>=50)	13.64	95% Gamma Adjusted KM-UCL (use when n<50)	14.34

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	4.978	Mean in Log Scale	1.013
SD in Original Scale	8.919	SD in Log Scale	0.883
95% t UCL (assumes normality of ROS data)	8.887	95% Percentile Bootstrap UCL	9.091
95% BCA Bootstrap UCL	11.48	95% Bootstrap t UCL	36.49
95% H-UCL (Log ROS)	7.239		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.014	KM Geo Mean	7.491
KM SD (logged)	0.482	95% Critical H Value (KM-Log)	2.032
KM Standard Error of Mean (logged)	0.202	95% H-UCL (KM -Log)	10.84
KM SD (logged)	0.482	95% Critical H Value (KM-Log)	2.032
KM Standard Error of Mean (logged)	0.202		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	9.097	Mean in Log Scale	2.012
SD in Original Scale	7.873	SD in Log Scale	0.586
95% t UCL (Assumes normality)	12.55	95% H-Stat UCL	12.28

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL 21.25

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (1,2,3,4,7,8-hexachlorodibenzofuran)

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

General Statistics

Total Number of Observations	16	Number of Distinct Observations	13
Number of Detects	5	Number of Non-Detects	11
Number of Distinct Detects	5	Number of Distinct Non-Detects	9
Minimum Detect	9.6	Minimum Non-Detect	7.9
Maximum Detect	58	Maximum Non-Detect	20
Variance Detects	422	Percent Non-Detects	68.75%
Mean Detects	24.92	SD Detects	20.54
Median Detects	13	CV Detects	0.824
Skewness Detects	1.399	Kurtosis Detects	1.145
Mean of Logged Detects	2.968	SD of Logged Detects	0.764

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.811	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.319	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	14.49	KM Standard Error of Mean	3.573
KM SD	12.54	95% KM (BCA) UCL	21.18
95% KM (t) UCL	20.76	95% KM (Percentile Bootstrap) UCL	20.56
95% KM (z) UCL	20.37	95% KM Bootstrap t UCL	28.37
90% KM Chebyshev UCL	25.21	95% KM Chebyshev UCL	30.07
97.5% KM Chebyshev UCL	36.8	99% KM Chebyshev UCL	50.04

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.483	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.684	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.334	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.36	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	2.167	k star (bias corrected MLE)	1
Theta hat (MLE)	11.5	Theta star (bias corrected MLE)	24.91
nu hat (MLE)	21.67	nu star (bias corrected)	10
Mean (detects)	24.92		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	9.861
Maximum	58	Median	3.335
SD	15.2	CV	1.542
k hat (MLE)	0.343	k star (bias corrected MLE)	0.32
Theta hat (MLE)	28.76	Theta star (bias corrected MLE)	30.8
nu hat (MLE)	10.97	nu star (bias corrected)	10.25
Adjusted Level of Significance (β)	0.0335		
Approximate Chi Square Value (10.25, α)	4.096	Adjusted Chi Square Value (10.25, β)	3.664
95% Gamma Approximate UCL (use when n>=50)	24.67	95% Gamma Adjusted UCL (use when n<50)	27.58

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	14.49	SD (KM)	12.54
Variance (KM)	157.3	SE of Mean (KM)	3.573
k hat (KM)	1.335	k star (KM)	1.126
nu hat (KM)	42.72	nu star (KM)	36.04
theta hat (KM)	10.86	theta star (KM)	12.87
80% gamma percentile (KM)	23.09	90% gamma percentile (KM)	32.41
95% gamma percentile (KM)	41.64	99% gamma percentile (KM)	62.9

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (36.04, α)	23.3	Adjusted Chi Square Value (36.04, β)	22.14
95% Gamma Approximate KM-UCL (use when n>=50)	22.42	95% Gamma Adjusted KM-UCL (use when n<50)	23.59

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.878	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.301	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	12.88	Mean in Log Scale	2.269
SD in Original Scale	13.66	SD in Log Scale	0.687
95% t UCL (assumes normality of ROS data)	18.87	95% Percentile Bootstrap UCL	19.19
95% BCA Bootstrap UCL	21.91	95% Bootstrap t UCL	37.43
95% H-UCL (Log ROS)	18.29		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.481	KM Geo Mean	11.95
KM SD (logged)	0.527	95% Critical H Value (KM-Log)	2.078
KM Standard Error of Mean (logged)	0.163	95% H-UCL (KM -Log)	18.22
KM SD (logged)	0.527	95% Critical H Value (KM-Log)	2.078
KM Standard Error of Mean (logged)	0.163		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	13.13	Mean in Log Scale	2.315
SD in Original Scale	13.5	SD in Log Scale	0.644
95% t UCL (Assumes normality)	19.05	95% H-Stat UCL	17.99

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	20.76

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (1,2,3,4,7,8-hexachlorodibenzo-p-dioxin)

General Statistics

Total Number of Observations	16	Number of Distinct Observations	13
Number of Detects	2	Number of Non-Detects	14
Number of Distinct Detects	2	Number of Distinct Non-Detects	12
Minimum Detect	11	Minimum Non-Detect	6
Maximum Detect	12	Maximum Non-Detect	20
Variance Detects	0.5	Percent Non-Detects	87.5%
Mean Detects	11.5	SD Detects	0.707
Median Detects	11.5	CV Detects	0.0615
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	2.441	SD of Logged Detects	0.0615

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only
Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	7.571	KM Standard Error of Mean	1.336
KM SD	2.499	95% KM (BCA) UCL	N/A
95% KM (t) UCL	9.913	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	9.769	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	11.58	95% KM Chebyshev UCL	13.39
97.5% KM Chebyshev UCL	15.91	99% KM Chebyshev UCL	20.86

Gamma GOF Tests on Detected Observations Only
Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	528.7	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0218	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	2115	nu star (bias corrected)	N/A
Mean (detects)	11.5		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	7.571	SD (KM)	2.499
Variance (KM)	6.245	SE of Mean (KM)	1.336
k hat (KM)	9.18	k star (KM)	7.5
nu hat (KM)	293.8	nu star (KM)	240
theta hat (KM)	0.825	theta star (KM)	1.009
80% gamma percentile (KM)	9.747	90% gamma percentile (KM)	11.26
95% gamma percentile (KM)	12.62	99% gamma percentile (KM)	15.43

Gamma Kaplan-Meier (KM) Statistics

		Adjusted Level of Significance (β)	0.0335
Approximate Chi Square Value (240.01, α)	205.1	Adjusted Chi Square Value (240.01, β)	201.5
95% Gamma Approximate KM-UCL (use when n>=50)	8.858	95% Gamma Adjusted KM-UCL (use when n<50)	9.019

Lognormal GOF Test on Detected Observations Only
Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	9.313	Mean in Log Scale	2.226
SD in Original Scale	1.014	SD in Log Scale	0.102
95% t UCL (assumes normality of ROS data)	9.758	95% Percentile Bootstrap UCL	9.735
95% BCA Bootstrap UCL	9.82	95% Bootstrap t UCL	9.977
95% H-UCL (Log ROS)	9.753		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	1.977	KM Geo Mean	7.224
KM SD (logged)	0.294	95% Critical H Value (KM-Log)	1.867
KM Standard Error of Mean (logged)	0.157	95% H-UCL (KM -Log)	8.694
KM SD (logged)	0.294	95% Critical H Value (KM-Log)	1.867
KM Standard Error of Mean (logged)	0.157		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	7.472	Mean in Log Scale	1.936
SD in Original Scale	2.738	SD in Log Scale	0.421
95% t UCL (Assumes normality)	8.672	95% H-Stat UCL	9.384

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	9.913	KM H-UCL	8.694
95% KM (BCA) UCL	N/A		

Warning: One or more Recommended UCL(s) not available!

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (1,2,3,6,7,8-hexachlorodibenzofuran)

General Statistics

Total Number of Observations	16	Number of Distinct Observations	13
Number of Detects	3	Number of Non-Detects	13
Number of Distinct Detects	3	Number of Distinct Non-Detects	11
Minimum Detect	10	Minimum Non-Detect	7.7
Maximum Detect	31	Maximum Non-Detect	20
Variance Detects	124.3	Percent Non-Detects	81.25%
Mean Detects	18.33	SD Detects	11.15
Median Detects	14	CV Detects	0.608
Skewness Detects	1.485	Kurtosis Detects	N/A
Mean of Logged Detects	2.792	SD of Logged Detects	0.581

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.887	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.318	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	10.37	KM Standard Error of Mean	1.871
KM SD	5.706	95% KM (BCA) UCL	N/A
95% KM (t) UCL	13.65	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	13.44	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	15.98	95% KM Chebyshev UCL	18.52
97.5% KM Chebyshev UCL	22.05	99% KM Chebyshev UCL	28.99

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	4.439	k star (bias corrected MLE)	N/A
Theta hat (MLE)	4.13	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	26.63	nu star (bias corrected)	N/A
Mean (detects)	18.33		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	4.03
Maximum	31	Median	0.01
SD	8.331	CV	2.067
k hat (MLE)	0.193	k star (bias corrected MLE)	0.198
Theta hat (MLE)	20.93	Theta star (bias corrected MLE)	20.34
nu hat (MLE)	6.163	nu star (bias corrected)	6.341
Adjusted Level of Significance (β)	0.0335		
Approximate Chi Square Value (6.34, α)	1.817	Adjusted Chi Square Value (6.34, β)	1.555
95% Gamma Approximate UCL (use when n>=50)	14.07	95% Gamma Adjusted UCL (use when n<50)	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	10.37	SD (KM)	5.706
Variance (KM)	32.56	SE of Mean (KM)	1.871
k hat (KM)	3.301	k star (KM)	2.723
nu hat (KM)	105.6	nu star (KM)	87.15
theta hat (KM)	3.141	theta star (KM)	3.806
80% gamma percentile (KM)	14.96	90% gamma percentile (KM)	18.79
95% gamma percentile (KM)	22.37	99% gamma percentile (KM)	30.2

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (87.15, α)	66.63	Adjusted Chi Square Value (87.15, β)	64.59
95% Gamma Approximate KM-UCL (use when n>=50)	13.56	95% Gamma Adjusted KM-UCL (use when n<50)	13.99

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.948	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.27	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	7.339	Mean in Log Scale	1.772
SD in Original Scale	6.912	SD in Log Scale	0.596
95% t UCL (assumes normality of ROS data)	10.37	95% Percentile Bootstrap UCL	10.24
95% BCA Bootstrap UCL	12.46	95% Bootstrap t UCL	17.04
95% H-UCL (Log ROS)	9.783		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.252	KM Geo Mean	9.506
KM SD (logged)	0.364	95% Critical H Value (KM-Log)	1.923
KM Standard Error of Mean (logged)	0.131	95% H-UCL (KM -Log)	12.17
KM SD (logged)	0.364	95% Critical H Value (KM-Log)	1.923
KM Standard Error of Mean (logged)	0.131		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	9.284	Mean in Log Scale	2.086
SD in Original Scale	6.375	SD in Log Scale	0.514
95% t UCL (Assumes normality)	12.08	95% H-Stat UCL	12.08

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	13.65

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (1,2,3,6,7,8-hexachlorodibenzo-p-dioxin)

General Statistics

Total Number of Observations	16	Number of Distinct Observations	12
Number of Detects	10	Number of Non-Detects	6
Number of Distinct Detects	8	Number of Distinct Non-Detects	6
Minimum Detect	9	Minimum Non-Detect	7.9
Maximum Detect	54	Maximum Non-Detect	20
Variance Detects	148	Percent Non-Detects	37.5%
Mean Detects	24.4	SD Detects	12.17

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Median Detects	21	CV Detects	0.499
Skewness Detects	1.772	Kurtosis Detects	4.015
Mean of Logged Detects	3.098	SD of Logged Detects	0.458

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.788	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.313	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	Detected Data Not Normal at 5% Significance Level	

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	18.55	KM Standard Error of Mean	3.161
KM SD	11.92	95% KM (BCA) UCL	24.62
95% KM (t) UCL	24.09	95% KM (Percentile Bootstrap) UCL	24.38
95% KM (z) UCL	23.75	95% KM Bootstrap t UCL	26.38
90% KM Chebyshev UCL	28.03	95% KM Chebyshev UCL	32.33
97.5% KM Chebyshev UCL	38.29	99% KM Chebyshev UCL	50

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.772	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.729	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.258	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.267	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	5.361	k star (bias corrected MLE)	3.819
Theta hat (MLE)	4.551	Theta star (bias corrected MLE)	6.388
nu hat (MLE)	107.2	nu star (bias corrected)	76.39
Mean (detects)	24.4		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	16.79
Maximum	54	Median	19
SD	13.91	CV	0.828
k hat (MLE)	0.865	k star (bias corrected MLE)	0.744
Theta hat (MLE)	19.42	Theta star (bias corrected MLE)	22.57
nu hat (MLE)	27.67	nu star (bias corrected)	23.81
Adjusted Level of Significance (β)	0.0335		
Approximate Chi Square Value (23.81, α)	13.71	Adjusted Chi Square Value (23.81, β)	12.84
95% Gamma Approximate UCL (use when n>=50)	29.17	95% Gamma Adjusted UCL (use when n<50)	31.15

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	18.55	SD (KM)	11.92
Variance (KM)	142.1	SE of Mean (KM)	3.161
k hat (KM)	2.421	k star (KM)	2.009
nu hat (KM)	77.47	nu star (KM)	64.28
theta hat (KM)	7.662	theta star (KM)	9.235
80% gamma percentile (KM)	27.76	90% gamma percentile (KM)	36.04
95% gamma percentile (KM)	43.94	99% gamma percentile (KM)	61.45

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (64.28, α)	46.83	Adjusted Chi Square Value (64.28, β)	45.14
95% Gamma Approximate KM-UCL (use when n>=50)	25.46	95% Gamma Adjusted KM-UCL (use when n<50)	26.41

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.885	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.268	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	Detected Data Not Lognormal at 5% Significance Level	

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	18.57	Mean in Log Scale	2.751
SD in Original Scale	12.24	SD in Log Scale	0.59
95% t UCL (assumes normality of ROS data)	23.93	95% Percentile Bootstrap UCL	23.69
95% BCA Bootstrap UCL	25.46	95% Bootstrap t UCL	26.48
95% H-UCL (Log ROS)	25.84		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.745	KM Geo Mean	15.56
KM SD (logged)	0.581	95% Critical H Value (KM-Log)	2.138
KM Standard Error of Mean (logged)	0.156	95% H-UCL (KM -Log)	25.4
KM SD (logged)	0.581	95% Critical H Value (KM-Log)	2.138
KM Standard Error of Mean (logged)	0.156		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	18.15	Mean in Log Scale	2.685
SD in Original Scale	12.66	SD in Log Scale	0.69
95% t UCL (Assumes normality)	23.7	95% H-Stat UCL	27.85

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	26.41	95% GROS Adjusted Gamma UCL	31.15

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test

When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (1,2,3,7,8,9-hexachlorodibenzofuran)

General Statistics

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Total Number of Observations	16	Number of Distinct Observations	13
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	13

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable result (1,2,3,7,8,9-hexachlorodibenzofuran) was not processed!

result (1,2,3,7,8,9-hexachlorodibenzo-p-dioxin)

General Statistics

Total Number of Observations	16	Number of Distinct Observations	13
Number of Detects	8	Number of Non-Detects	8
Number of Distinct Detects	8	Number of Distinct Non-Detects	7
Minimum Detect	6	Minimum Non-Detect	7.9
Maximum Detect	28	Maximum Non-Detect	20
Variance Detects	47.14	Percent Non-Detects	50%
Mean Detects	19	SD Detects	6.866
Median Detects	20	CV Detects	0.361
Skewness Detects	-0.816	Kurtosis Detects	0.766
Mean of Logged Detects	2.861	SD of Logged Detects	0.485

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.955	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.169	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.283	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	13.75	KM Standard Error of Mean	2.256
KM SD	7.558	95% KM (BCA) UCL	18.11
95% KM (t) UCL	17.71	95% KM (Percentile Bootstrap) UCL	17.81
95% KM (z) UCL	17.46	95% KM Bootstrap t UCL	17.45
90% KM Chebyshev UCL	20.52	95% KM Chebyshev UCL	23.59
97.5% KM Chebyshev UCL	27.84	99% KM Chebyshev UCL	36.2

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.474	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.718	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.196	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.295	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	6.183	k star (bias corrected MLE)	3.948
Theta hat (MLE)	3.073	Theta star (bias corrected MLE)	4.813
nu hat (MLE)	98.93	nu star (bias corrected)	63.16
Mean (detects)	19		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	6	Mean	14.34
Maximum	28	Median	12.15
SD	6.838	CV	0.477
k hat (MLE)	4.938	k star (bias corrected MLE)	4.054
Theta hat (MLE)	2.903	Theta star (bias corrected MLE)	3.537
nu hat (MLE)	158	nu star (bias corrected)	129.7
Adjusted Level of Significance (β)	0.0335		
Approximate Chi Square Value (129.72, α)	104.4	Adjusted Chi Square Value (129.72, β)	101.8
95% Gamma Approximate UCL (use when n>=50)	17.81	95% Gamma Adjusted UCL (use when n<50)	18.26

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	13.75	SD (KM)	7.558
Variance (KM)	57.12	SE of Mean (KM)	2.256
k hat (KM)	3.311	k star (KM)	2.732
nu hat (KM)	106	nu star (KM)	87.43
theta hat (KM)	4.153	theta star (KM)	5.034
80% gamma percentile (KM)	19.84	90% gamma percentile (KM)	24.91
95% gamma percentile (KM)	29.66	99% gamma percentile (KM)	40.01

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (87.43, α)	66.87	Adjusted Chi Square Value (87.43, β)	64.83
95% Gamma Approximate KM-UCL (use when n>=50)	17.98	95% Gamma Adjusted KM-UCL (use when n<50)	18.55

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.828	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.227	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.283	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	14.01	Mean in Log Scale	2.524
SD in Original Scale	7.049	SD in Log Scale	0.493
95% t UCL (assumes normality of ROS data)	17.1	95% Percentile Bootstrap UCL	16.92
95% BCA Bootstrap UCL	17.04	95% Bootstrap t UCL	17.54
95% H-UCL (Log ROS)	18.27		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.452	KM Geo Mean	11.61
KM SD (logged)	0.598	95% Critical H Value (KM-Log)	2.158
KM Standard Error of Mean (logged)	0.189	95% H-UCL (KM -Log)	19.37
KM SD (logged)	0.598	95% Critical H Value (KM-Log)	2.158
KM Standard Error of Mean (logged)	0.189		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	13.5	Mean in Log Scale	2.449
SD in Original Scale	7.514	SD in Log Scale	0.584

95% t UCL (Assumes normality)	16.79	95% H-Stat UCL	18.96

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 17.71

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (1,2,3,7,8-pentachlorodibenzofuran)

General Statistics

Total Number of Observations	16	Number of Distinct Observations	13
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	13

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable result (1,2,3,7,8-pentachlorodibenzofuran) was not processed!

result (1,2,3,7,8-pentachlorodibenzo-p-dioxin)

General Statistics

Total Number of Observations	16	Number of Distinct Observations	14
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	13

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable result (1,2,3,7,8-pentachlorodibenzo-p-dioxin) was not processed!

result (2,3,4,6,7,8-hexachlorodibenzofuran)

General Statistics

Total Number of Observations	16	Number of Distinct Observations	12
Number of Detects	3	Number of Non-Detects	13
Number of Distinct Detects	3	Number of Distinct Non-Detects	11
Minimum Detect	8.5	Minimum Non-Detect	7.7
Maximum Detect	42	Maximum Non-Detect	20
Variance Detects	322.8	Percent Non-Detects	81.25%
Mean Detects	21.5	SD Detects	17.97
Median Detects	14	CV Detects	0.836
Skewness Detects	1.551	Kurtosis Detects	N/A
Mean of Logged Detects	2.839	SD of Logged Detects	0.817

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.869	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.329	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	10.75	KM Standard Error of Mean	2.609
KM SD	8.309	95% KM (BCA) UCL	N/A
95% KM (t) UCL	15.32	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	15.04	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	18.57	95% KM Chebyshev UCL	22.12
97.5% KM Chebyshev UCL	27.04	99% KM Chebyshev UCL	36.7

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	2.335	k star (bias corrected MLE)	N/A
Theta hat (MLE)	9.206	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	14.01	nu star (bias corrected)	N/A
Mean (detects)	21.5		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	4.059
Maximum	42	Median	0.01
SD	10.86	CV	2.675
k hat (MLE)	0.176	k star (bias corrected MLE)	0.185
Theta hat (MLE)	23.04	Theta star (bias corrected MLE)	21.96
nu hat (MLE)	5.637	nu star (bias corrected)	5.914
Adjusted Level of Significance (β)	0.0335		
Approximate Chi Square Value (5.91, α)	1.596	Adjusted Chi Square Value (5.91, β)	1.356
95% Gamma Approximate UCL (use when n>=50)	15.04	95% Gamma Adjusted UCL (use when n<50)	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	10.75	SD (KM)	8.309
Variance (KM)	69.03	SE of Mean (KM)	2.609
k hat (KM)	1.673	k star (KM)	1.401
nu hat (KM)	53.53	nu star (KM)	44.83
theta hat (KM)	6.424	theta star (KM)	7.671
80% gamma percentile (KM)	16.75	90% gamma percentile (KM)	22.77
95% gamma percentile (KM)	28.64	99% gamma percentile (KM)	41.97

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (44.83, α)	30.47	Adjusted Chi Square Value (44.83, β)	29.12
95% Gamma Approximate KM-UCL (use when n>=50)	15.81	95% Gamma Adjusted KM-UCL (use when n<50)	16.54

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.955	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.263	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	6.555	Mean in Log Scale	1.4
SD in Original Scale	9.964	SD in Log Scale	0.84
95% t UCL (assumes normality of ROS data)	10.92	95% Percentile Bootstrap UCL	11.23
95% BCA Bootstrap UCL	13.7	95% Bootstrap t UCL	24.42
95% H-UCL (Log ROS)	9.855		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.238	KM Geo Mean	9.371
KM SD (logged)	0.43	95% Critical H Value (KM-Log)	1.982
KM Standard Error of Mean (logged)	0.143	95% H-UCL (KM -Log)	12.81
KM SD (logged)	0.43	95% Critical H Value (KM-Log)	1.982
KM Standard Error of Mean (logged)	0.143		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	9.878	Mean in Log Scale	2.094
SD in Original Scale	8.955	SD in Log Scale	0.567
95% t UCL (Assumes normality)	13.8	95% H-Stat UCL	13.01

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	15.32

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (2,3,4,7,8-pentachlorodibenzofuran)

General Statistics

Total Number of Observations	16	Number of Distinct Observations	14
Number of Detects	3	Number of Non-Detects	13
Number of Distinct Detects	3	Number of Distinct Non-Detects	11
Minimum Detect	12	Minimum Non-Detect	7.7
Maximum Detect	59	Maximum Non-Detect	20
Variance Detects	622.3	Percent Non-Detects	81.25%
Mean Detects	30.67	SD Detects	24.95
Median Detects	21	CV Detects	0.813
Skewness Detects	1.482	Kurtosis Detects	N/A
Mean of Logged Detects	3.202	SD of Logged Detects	0.808

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.887	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.317	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	12.49	KM Standard Error of Mean	3.879
KM SD	12.48	95% KM (BCA) UCL	N/A
95% KM (t) UCL	19.29	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	18.87	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	24.13	95% KM Chebyshev UCL	29.4
97.5% KM Chebyshev UCL	36.71	99% KM Chebyshev UCL	51.08

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	2.418	k star (bias corrected MLE)	N/A
Theta hat (MLE)	12.69	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	14.51	nu star (bias corrected)	N/A
Mean (detects)	30.67		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	5.758
Maximum	59	Median	0.01
SD	15.35	CV	2.666
k hat (MLE)	0.156	k star (bias corrected MLE)	0.169
Theta hat (MLE)	36.87	Theta star (bias corrected MLE)	34.16
nu hat (MLE)	4.998	nu star (bias corrected)	5.394
Adjusted Level of Significance (β)	0.0335		
Approximate Chi Square Value (5.39, α)	1.339	Adjusted Chi Square Value (5.39, β)	1.125
95% Gamma Approximate UCL (use when n>=50)	23.2	95% Gamma Adjusted UCL (use when n<50)	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	12.49	SD (KM)	12.48
Variance (KM)	155.8	SE of Mean (KM)	3.879
k hat (KM)	1.001	k star (KM)	0.855

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

nu hat (KM)	32.04	nu star (KM)	27.36
theta hat (KM)	12.48	theta star (KM)	14.61
80% gamma percentile (KM)	20.33	90% gamma percentile (KM)	29.88
95% gamma percentile (KM)	39.56	99% gamma percentile (KM)	62.29

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (27.36, α)	16.43	Adjusted Chi Square Value (27.36, β)	15.47
95% Gamma Approximate KM-UCL (use when n>=50)	20.8	95% Gamma Adjusted KM-UCL (use when n<50)	22.09

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.971	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.244	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	7.524	Mean in Log Scale	1.172
SD in Original Scale	14.68	SD in Log Scale	1.108
95% t UCL (assumes normality of ROS data)	13.96	95% Percentile Bootstrap UCL	14.2
95% BCA Bootstrap UCL	19.06	95% Bootstrap t UCL	34.46
95% H-UCL (Log ROS)	13.57		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.309	KM Geo Mean	10.06
KM SD (logged)	0.534	95% Critical H Value (KM-Log)	2.086
KM Standard Error of Mean (logged)	0.177	95% H-UCL (KM -Log)	15.47
KM SD (logged)	0.534	95% Critical H Value (KM-Log)	2.086
KM Standard Error of Mean (logged)	0.177		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	11.6	Mean in Log Scale	2.162
SD in Original Scale	13.28	SD in Log Scale	0.67
95% t UCL (Assumes normality)	17.42	95% H-Stat UCL	16.04

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	19.29

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (2,3,7,8-tetrachlorodibenzofuran)

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
Number of Detects	15	Number of Non-Detects	1
Number of Distinct Detects	15	Number of Distinct Non-Detects	1
Minimum Detect	4.3	Minimum Non-Detect	3.5
Maximum Detect	30	Maximum Non-Detect	3.5
Variance Detects	46.16	Percent Non-Detects	6.25%
Mean Detects	11.15	SD Detects	6.794
Median Detects	8.4	CV Detects	0.609
Skewness Detects	1.671	Kurtosis Detects	3.233
Mean of Logged Detects	2.268	SD of Logged Detects	0.54

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.832	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.881	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.241	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.22	Detected Data Not Normal at 5% Significance Level	

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	10.68	KM Standard Error of Mean	1.713
KM SD	6.62	95% KM (BCA) UCL	13.86
95% KM (t) UCL	13.68	95% KM (Percentile Bootstrap) UCL	13.54
95% KM (z) UCL	13.49	95% KM Bootstrap t UCL	15.25
90% KM Chebyshev UCL	15.81	95% KM Chebyshev UCL	18.14
97.5% KM Chebyshev UCL	21.37	99% KM Chebyshev UCL	27.72

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.442	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.742	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.208	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.223	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	3.625	k star (bias corrected MLE)	2.944
Theta hat (MLE)	3.077	Theta star (bias corrected MLE)	3.788
nu hat (MLE)	108.7	nu star (bias corrected)	88.33
Mean (detects)	11.15		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	10.46
Maximum	30	Median	8.35
SD	7.13	CV	0.682
k hat (MLE)	1.119	k star (bias corrected MLE)	0.951
Theta hat (MLE)	9.345	Theta star (bias corrected MLE)	11
nu hat (MLE)	35.81	nu star (bias corrected)	30.43
Adjusted Level of Significance (β)	0.0335		
Approximate Chi Square Value (30.43, α)	18.83	Adjusted Chi Square Value (30.43, β)	17.79
95% Gamma Approximate UCL (use when n>=50)	16.9	95% Gamma Adjusted UCL (use when n<50)	17.88

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	10.68	SD (KM)	6.62
Variance (KM)	43.82	SE of Mean (KM)	1.713
k hat (KM)	2.601	k star (KM)	2.155
nu hat (KM)	83.22	nu star (KM)	68.95
theta hat (KM)	4.105	theta star (KM)	4.954
80% gamma percentile (KM)	15.84	90% gamma percentile (KM)	20.4
95% gamma percentile (KM)	24.74	99% gamma percentile (KM)	34.3

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (68.95, α)	50.84	Adjusted Chi Square Value (68.95, β)	49.07
95% Gamma Approximate KM-UCL (use when n>=50)	14.48	95% Gamma Adjusted KM-UCL (use when n<50)	15

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.959	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.881	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.176	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.22	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	10.62	Mean in Log Scale	2.185
SD in Original Scale	6.906	SD in Log Scale	0.618
95% t UCL (assumes normality of ROS data)	13.64	95% Percentile Bootstrap UCL	13.68
95% BCA Bootstrap UCL	14.24	95% Bootstrap t UCL	14.93
95% H-UCL (Log ROS)	15.24		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.204	KM Geo Mean	9.062
KM SD (logged)	0.562	95% Critical H Value (KM-Log)	2.116
KM Standard Error of Mean (logged)	0.145	95% H-UCL (KM -Log)	14.43
KM SD (logged)	0.562	95% Critical H Value (KM-Log)	2.116
KM Standard Error of Mean (logged)	0.145		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	10.57	Mean in Log Scale	2.161
SD in Original Scale	6.972	SD in Log Scale	0.674
95% t UCL (Assumes normality)	13.62	95% H-Stat UCL	16.11

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	15	95% GROS Adjusted Gamma UCL	17.88

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

result (2,3,7,8-tetrachlorodibenzo-p-dioxin)

General Statistics

Total Number of Observations	16	Number of Distinct Observations	13
Number of Detects	5	Number of Non-Detects	11
Number of Distinct Detects	5	Number of Distinct Non-Detects	10
Minimum Detect	2.8	Minimum Non-Detect	1.2
Maximum Detect	4.4	Maximum Non-Detect	4
Variance Detects	0.397	Percent Non-Detects	68.75%
Mean Detects	3.68	SD Detects	0.63
Median Detects	3.9	CV Detects	0.171
Skewness Detects	-0.532	Kurtosis Detects	-0.845
Mean of Logged Detects	1.29	SD of Logged Detects	0.179

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.956	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.237	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	2.195	KM Standard Error of Mean	0.395
KM SD	1.199	95% KM (BCA) UCL	3.185
95% KM (t) UCL	2.887	95% KM (Percentile Bootstrap) UCL	3.018
95% KM (z) UCL	2.845	95% KM Bootstrap t UCL	2.474
90% KM Chebyshev UCL	3.38	95% KM Chebyshev UCL	3.917
97.5% KM Chebyshev UCL	4.662	99% KM Chebyshev UCL	6.126

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.288	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.678	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.265	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.357	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	40.39	k star (bias corrected MLE)	16.29
Theta hat (MLE)	0.0911	Theta star (bias corrected MLE)	0.226
nu hat (MLE)	403.9	nu star (bias corrected)	162.9
Mean (detects)	3.68		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	1.878	Mean	2.661
Maximum	4.4	Median	2.333
SD	0.799	CV	0.3
k hat (MLE)	13.69	k star (bias corrected MLE)	11.17
Theta hat (MLE)	0.194	Theta star (bias corrected MLE)	0.238
nu hat (MLE)	438.1	nu star (bias corrected)	357.3

Table A.3

ProUCL Raw Output for Site-wide Sediment

Whale Creek Mitigation Bank site, Old Bridge, New Jersey

Adjusted Level of Significance (β)	0.0335		
Approximate Chi Square Value (357.32, α)	314.5	Adjusted Chi Square Value (357.32, β)	309.9
95% Gamma Approximate UCL (use when n>=50)	3.024	95% Gamma Adjusted UCL (use when n<50)	3.068

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.195	SD (KM)	1.199
Variance (KM)	1.438	SE of Mean (KM)	0.395
k hat (KM)	3.35	k star (KM)	2.764
nu hat (KM)	107.2	nu star (KM)	88.44
theta hat (KM)	0.655	theta star (KM)	0.794
80% gamma percentile (KM)	3.162	90% gamma percentile (KM)	3.965
95% gamma percentile (KM)	4.717	99% gamma percentile (KM)	6.355

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (88.44, α)	67.76	Adjusted Chi Square Value (88.44, β)	65.7
95% Gamma Approximate KM-UCL (use when n>=50)	2.865	95% Gamma Adjusted KM-UCL (use when n<50)	2.955

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.939	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.253	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	2.753	Mean in Log Scale	0.984
SD in Original Scale	0.734	SD in Log Scale	0.239
95% t UCL (assumes normality of ROS data)	3.075	95% Percentile Bootstrap UCL	3.066
95% BCA Bootstrap UCL	3.089	95% Bootstrap t UCL	3.199
95% H-UCL (Log ROS)	3.082		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.64	KM Geo Mean	1.896
KM SD (logged)	0.534	95% Critical H Value (KM-Log)	2.086
KM Standard Error of Mean (logged)	0.183	95% H-UCL (KM -Log)	2.915
KM SD (logged)	0.534	95% Critical H Value (KM-Log)	2.086
KM Standard Error of Mean (logged)	0.183		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	2.172	Mean in Log Scale	0.634
SD in Original Scale	1.165	SD in Log Scale	0.566
95% t UCL (Assumes normality)	2.682	95% H-Stat UCL	3.017

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	2.887

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Table A.4
Calculation of Toxicity Equivalency (TEQ) for PCB Congeners by the Laboratory
Whale Creek Mitigation Bank site, Old Bridge, New Jersey

PCB Report						**Method 1668A**
Analyte	**Method Blank A9587_14621**	**AC95422-001**	**AC95422-002**	**AC95422-003**	**AC95422-004**	**AC95422-005**
	ng/kg	ng/kg	ng/kg	ng/kg	ng/kg	ng/kg
PCB-77	(1.41)	83.8	114	103	25.6	244
PCB-81	(1.57)	(4.79)	(4.47)	(3.99)	(5.11)	(10.6)
PCB-105	(1.12)	314	710	490	237	2,090
PCB-114	(1.05)	[9.2]	28	21.3	12	83.3
PCB-118	3.45	688	1,460	1,120	538	3,630
PCB-123	(1.07)	12.3	23.1	24.5	[8.73]	136
PCB-126	(0.762)	(3.46)	14.2	12.8	(3.22)	[65.5]
PCB-156/157	(1.08)	79.6	181	139	[37]	1,590
PCB-167	(0.796)	28.3	66.9	60.3	[12]	829
PCB-169	(0.869)	(3.39)	(3.8)	(4.06)	(2.56)	(22.3)
PCB-189	(0.895)	7.09	[12.3]	[11.6]	(2.62)	307
Total Mono-CB	(1.19)	35.8	(2.6)	44.1	(4.72)	59.4
Total Di-CB	13.9	466	254	431	276	199
Total Tri-CB	(2.24)	1,760	1,230	1,400	3,230	809
Total Tetra-CB	12.8	3,570	5,090	3,720	14,200	7,370
Total Penta-CB	20.3	4,360	9,630	6,920	7,230	67,100
Total Hexa-CB	7.19	3,500	8,400	6,450	1,710	100,000
Total Hepta-CB	(1.08)	1,470	3,300	3,170	486	76,000
Total Octa-CB	(0.994)	472	2,600	944	150	86,600
Total Nona-CB	(2.14)	129	4,560	253	29.2	109,000
Total Deca-CB	(1.52)	79.3	952	163	48.1	53,800
TEQs (WHO 2005 M/H)						
ND = 0; EMPC = 0	0.000103	0.0423	1.5	1.35	0.0262	0.285
ND = 0; EMPC = EMPC	0.000103	0.0425	1.5	1.35	0.0279	6.84
ND = DL/2; EMPC = 0	0.0517	0.267	1.56	1.41	0.227	1.46
ND = DL/2; EMPC = EMPC	0.0517	0.267	1.56	1.41	0.228	7.17
ND = DL; EMPC = 0	0.103	0.492	1.62	1.47	0.427	2.64
ND = DL; EMPC = EMPC	0.103	0.492	1.62	1.47	0.428	7.51

Table A.4
Calculation of Toxicity Equivalency (TEQ) for PCB Congeners by the Laboratory
Whale Creek Mitigation Bank site, Old Bridge, New Jersey

PCB Report						**Method 1668A**
Analyte	**AC95422-006**	**AC95422-007**	**AC95422-008**	**AC95422-009**	**AC95422-010**	
	ng/kg	ng/kg	ng/kg	ng/kg	ng/kg	
PCB-77	238	521	326	28.8	225	
PCB-81	(5.91)	12.3	7.48	(4.95)	9.37	
PCB-105	837	1,310	1,150	109	996	
PCB-114	35.6	54.3	43.6	(3.39)	35.3	
PCB-118	1,910	3,200	2,700	214	2,000	
PCB-123	55.4	64.8	56.9	7.31	55.8	
PCB-126	21.7	23.1	[15]	(3.02)	21.3	
PCB-156/157	345	377	297	21.1	273	
PCB-167	188	158	131	11.7	120	
PCB-169	(12)	(8.76)	(5.61)	(3.21)	(3.58)	
PCB-189	63.5	37.9	32.4	(2.64)	27.5	
Total Mono-CB	113	362	292	31.4	71.4	
Total Di-CB	1,080	3,230	2,520	382	694	
Total Tri-CB	3,700	10,600	8,220	773	2,500	
Total Tetra-CB	8,600	21,300	15,400	1,210	7,650	
Total Penta-CB	19,300	24,000	21,200	1,410	15,900	
Total Hexa-CB	24,900	18,600	15,900	975	12,400	
Total Hepta-CB	19,700	8,780	7,350	440	5,840	
Total Octa-CB	6,590	3,130	2,600	141	1,920	
Total Nona-CB	1,180	967	685	99.3	515	
Total Deca-CB	629	731	522	30.6	345	
TEQs (WHO 2005 M/H)						
ND = 0; EMPC = 0	2.29	2.52	0.167	0.0138	2.26	
ND = 0; EMPC = EMPC	2.29	2.52	1.67	0.0138	2.26	
ND = DL/2; EMPC = 0	2.47	2.65	0.421	0.214	2.32	
ND = DL/2; EMPC = EMPC	2.47	2.65	1.75	0.214	2.32	
ND = DL; EMPC = 0	2.66	2.78	0.675	0.413	2.37	
ND = DL; EMPC = EMPC	2.66	2.78	1.84	0.413	2.37	

Note:
Parenthesis () indicate the value is the detection limit and brackets [] indicate the concentration is an "estimated maximum possible concentration" with an EMPC qualifier.

Table A.5
Calculation of Toxicity Equivalency (TEQ) for PCB Congeners using the USEPA TEQ Calculator
Whale Creek Mitigation Bank site, Old Bridge, New Jersey

EPA Basic KM TEQ and ISM UCL Calculator

Sample Notes	Chemical Sort Order	18	19	20	21	22	23	24	25	26	27	28	29	KM Method	Qualifiers and Qualifier Fractions			
	WHO 2005 TEFs =	0.0001	0.0003	0.00003	0.00003	0.00003	0.00003	0.1	0.00003	0.00003	0.00003	0.03	0.00003					
	Sample ID (must enter on Row A)	PCB 77	PCB 81	PCB 105	PCB 114	PCB 118	PCB 123	PCB 126	PCB 156	PCB 157	PCB 167	PCB 169	PCB 189	Sample total TEQ	TEQ qualifier	Fraction from nondetect and estimated results	Fraction from dioxins and furans	Fraction from dioxin-like PCB congeners
	AC95422-001: Row A	83.8	4.79 U	314	9.2 U	688	12.3	3.46*	79.6		28.3	3.39 U	7.09					
	value to use for KM: Row B	83.8	4.79	314	9.2	688	12.3	3.46	79.6		28.3	3.39	7.09					
	TEC for KM: Row C	0.00838	0.00144	0.00942	0.00028	0.02064	0.00037	0.346	0.00239	0	0.00085	0.1017	0.00021	0.3936	none	21%	0%	100%
	AC95422-002: Row A	114	4.47 U	710	28	1460	23.1	14.2	181		66.9	3.8 U	12.3 U					
	value to use for KM: Row B	114	4.47	710	28	1460	23.1	14.2	181		66.9	3.8	12.3					
	TEC for KM: Row C	0.0114	0.00134	0.0213	0.00084	0.0438	0.00069	1.42	0.00543	0	0.00201	0.114	0.00037	1.5161	none	7%	0%	100%
	AC95422-003: Row A	103	3.99 U	490	21.3	1120	24.5	12.8	139		60.3	4.06 U	11.6 U					
	value to use for KM: Row B	103	3.99	490	21.3	1120	24.5	12.8	139		60.3	4.06	11.6					
	TEC for KM: Row C	0.0103	0.0012	0.0147	0.00064	0.0336	0.00074	1.28	0.00417	0	0.00181	0.1218	0.00035	1.3543	none	8%	0%	100%
	AC95422-004: Row A	25.6	5.11 U	237	12	538	8.73 U	3.22*	37 U		12 U	2.56 U	2.62 U					
	value to use for KM: Row B	25.6	5.11	237	12	538	8.73	3.22	37		12	2.56	2.62					
	TEC for KM: Row C	0.00256	0.00153	0.00711	0.00036	0.01614	0.00026	0.322	0.00111	0	0.00036	0.0768	7.9E-05	0.3517	none	19%	0%	100%
	AC95422-005: Row A	244	10.6 U	2090	83.3	3630	136	65.5*	1590		829	22.3 U	307					
	value to use for KM: Row B	244	10.6	2090	83.3	3630	136	65.5	1590		829	22.3	307					
	TEC for KM: Row C	0.0244	0.00318	0.0627	0.0025	0.1089	0.00408	6.55	0.0477	0	0.02487	0.669	0.00921	6.8687	none	9%	0%	100%
	AC95422-006: Row A	238	5.91 U	837	35.6	1910	55.4	21.7	345		188	12 U	63.5					
	value to use for KM: Row B	238	5.91	837	35.6	1910	55.4	21.7	345		188	12	63.5					
	TEC for KM: Row C	0.0238	0.00177	0.02511	0.00107	0.0573	0.00166	2.17	0.01035	0	0.00564	0.36	0.00191	2.3124	none	14%	0%	100%
	AC95422-007: Row A	521	12.3	1310	54.3	3200	64.8	23.1	377		158	8.76 U	37.9					
	value to use for KM: Row B	521	12.3	1310	54.3	3200	64.8	23.1	377		158	8.76	37.9					
	TEC for KM: Row C	0.0521	0.00369	0.0393	0.00163	0.096	0.00194	2.31	0.01131	0	0.00474	0.2628	0.00114	2.5454	none	9%	0%	100%
	AC95422-008: Row A	326	7.48	1150	43.6	2700	56.9	15*	297		131	5.61 U	32.4					
	value to use for KM: Row B	326	7.48	1150	43.6	2700	56.9	15	297		131	5.61	32.4					
	TEC for KM: Row C	0.0326	0.00224	0.0345	0.00131	0.081	0.00171	1.5	0.00891	0	0.00393	0.1683	0.00097	1.6857	none	9%	0%	100%
	AC95422-009: Row A	28.8	4.95 U	109	3.39 U	214	7.31	3.02*	21.1		11.7	3.21 U	2.64 U					
	value to use for KM: Row B	28.8	4.95	109	3.39	214	7.31	3.02	21.1		11.7	3.21	2.64					
	TEC for KM: Row C	0.00288	0.00149	0.00327	0.0001	0.00642	0.00022	0.302	0.00063	0	0.00035	0.0963	7.9E-05	0.3178	none	24%	0%	100%
	AC95422-010: Row A	225	9.37	996	35.3	2000	55.8	21.3	273		120	3.58 U	27.5					
	value to use for KM: Row B	225	9.37	996	35.3	2000	55.8	21.3	273		120	3.58	27.5					
	TEC for KM: Row C	0.0225	0.00281	0.02988	0.00106	0.06	0.00167	2.13	0.00819	0	0.0036	0.1074	0.00083	2.2750	none	5%	0%	100%

Note:
PCB 126 concentrations flagged with a star (*) are non-detect concentrations in the sample, but were instead flagged as detect concentrations per Option 1 in the calculator instructions because the highest toxicity equivalency concentration (TEC) for the Kaplan Meier method was based on a nondetect value.

December 2016 Laboratory Results
PCB Analysis

FINAL LAB REPORT

6123013

A9587

26-Jan-2017

Prepared by

SGS NORTH AMERICA

Prepared for

Hampton-Clarke, Inc.

Melissa D'Almedia

175 Route 46 West
Fairfield, NJ 07004
Phone:
Email: mdalmedia@hcvlab.com

This report is approved by

Tamara Morgan

Senior Project Manager

PROJECT INFORMATION SUMMARY *(When applicable, see QC Annotations for details)*

Client Project	6123013
SGS Project #	A9587
Analytical Protocol(s)	1668A
No. Samples Submitted	10
Additional QC Sample(s)	0
No. Laboratory Method Blanks	1
No. OPRs / Batch CS3	1
Date Received	04-Jan-17
Condition Received	Good
Temperature upon Receipt (ºC)	3.0
Extraction within Holding Time	Yes
Analysis within Holding Time	Yes

QC ANNOTATIONS:

1. Please see Appendices attached for data qualifier/attribute and lab identifier descriptions which may be contained in the project.

APPENDIX A: GENERAL DATA QUALIFIERS / DATA ATTRIBUTES

B	The analyte was found in the method blank, at a concentration that was at least 10% of the concentration in the sample.
C	Two or more congeners co-elute. In EDDs, C denotes the lowest IUPAC congener in a co-elution group and additional co-eluters for the group are shown with the number of the lowest IUPAC co-eluter.
E	The reported concentration exceeds the calibration range (upper point of the calibration curve) and is an estimated value.
EMPC	Represents an Estimated Maximum Possible Concentration. EMPCs arise in cases where the signal/noise ratio is not sufficient for peak identification (the determined ion-abundance ratio is outside the allowed theoretical range), or where there is a co-eluting interference.
H/h	If the standard recovery is below the method or SOP specified value “H” is assigned. If the obtained value is less than half the specified value “h” is assigned.
J	Indicates that an analyte has a concentration below the reporting limit (lowest point of the calibration curve) and is an estimated value.
ND	Indicates a non-detect.
NR or R	Indicates a value that is not reportable.
PR	Due to interference, the associated congener is poorly resolved.
QI	Indicates the presence of a quantitative interference.
SI	Denotes “Single Ion Mode” and is utilized for PCBs where the secondary ion trace has a significantly elevated noise level due to background PFK. Responses for such peaks are calculated using an EMPC approach based solely on the primary ion area(s) and may be considered estimates.
U	The analyte was not detected. The estimated detection limit (EDL) may be reported for this analyte.
V	The labeled standard recovery was found to be outside of the method control limits.

APPENDIX B: DRBC/TMDL SPECIFIC DATA QUALIFIERS / DATA ATTRIBUTES

J	The reported result is an estimate. The value is less than the minimum calibration level but greater than the estimated detection limit (EDL).
U	The analyte was not detected in the sample at the estimated detection limit (EDL).
E	The reported concentration is an estimate. The value exceeds the upper calibration range (upper point of the calibration curve).
D	Dilution Data. Result was obtained from the analysis of a dilution.
B	Analyte found in the sample and associated method blank.
C	Co-eluting congener
Cxx	Co-elutes with the indicated congener, data is reported under the lowest IUPAC congener. 'Xx' denotes the IUPAC number with the lowest numerical designated congener.
NR	Analyte is not reportable because of problems in sample preparation or analysis.
V	Labeled standard recovery is not within method control limits.
X	Results from re-injection/repeat/second-column analysis.
EMPC	Estimated maximum possible concentration. Indicates that a peak is identified but did not meet the method specified ion-abundance ratio.

APPENDIX C: LAB IDENTIFIERS

AR	Indicates use of the archived portion of the sample extract.
CU	Indicates a sample that required additional clean-up prior to MS injection/processing.
D	Indicates a dilution of the sample extract. The number that follows the "D" indicates the dilution factor.
DE	Indicates a dilution performed with the addition of ES (extraction standard) solution.
DUP	Designation for a duplicate sample.
MS	Designation for a matrix spike.
MSD	Designation for a matrix spike duplicate.
RJ	Indicates a reinjection of the sample extract.
S	Indicates a sample split. The number that follows the "S" indicates the split factor.

SGS CERTIFICATIONS

Arkansas	88-0682
California (ELAP)	ELAP Cert #2914
CLIA	34D1013708
Connecticut	PH-0258
USDA Soil Permit	P330-14-00135
DoD	2726.01
Florida (Primary NELAP)	E87634
ISO 17025/IEC	2726.01
Louisiana	4115
Maine	#2016028
Massachusetts	M-NC919
Minnesota (Primary NELAP For Method 23)	Lab #037-999-459 Cert #981125
New Jersey	NC100
New York	11685
North Carolina DWR	481
North Dakota	R-197
Oregon	NC200002
Pennsylvania	68-03675
South Carolina	Lab #99029 Cert #99029002
Texas	T104704260-16-9
US Coast Guard	16714/159.317/SGS
Virginia	Lab #460214 Cert #8722
Washington	C913
West Virginia	293

Rev. 12-Sep-2016

PCB Report — Method 1668A

Analyte	Method Blank A9587_14621	AC95422-001	AC95422-002	AC95422-003	AC95422-004	AC95422-005
	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g
PCB-77	(1.41)	83.8	114	103	25.6	244
PCB-81	(1.57)	(4.79)	(4.47)	(3.99)	(5.11)	(10.6)
PCB-105	(1.12)	314	710	490	237	2,090
PCB-114	(1.05)	[9.2]	28	21.3	12	83.3
PCB-118	3.45	688	1,460	1,120	538	3,630
PCB-123	(1.07)	12.3	23.1	24.5	[8.73]	136
PCB-126	(0.762)	(3.46)	14.2	12.8	(3.22)	[65.5]
PCB-156/157	(1.08)	79.6	181	139	[37]	1,590
PCB-167	(0.796)	28.3	66.9	60.3	[12]	829
PCB-169	(0.869)	(3.39)	(3.8)	(4.06)	(2.56)	(22.3)
PCB-189	(0.895)	7.09	[12.3]	[11.6]	(2.62)	307
Total Mono-CB	(1.19)	35.8	(2.6)	44.1	(4.72)	59.4
Total Di-CB	13.9	466	254	431	276	199
Total Tri-CB	(2.24)	1,760	1,230	1,400	3,230	809
Total Tetra-CB	12.8	3,570	5,090	3,720	14,200	7,370
Total Penta-CB	20.3	4,360	9,630	6,920	7,230	67,100
Total Hexa-CB	7.19	3,500	8,400	6,450	1,710	100,000
Total Hepta-CB	(1.08)	1,470	3,300	3,170	486	76,000
Total Octa-CB	(0.994)	472	2,600	944	150	86,600
Total Nona-CB	(2.14)	129	4,560	253	29.2	109,000
Total Deca-CB	(1.52)	79.3	952	163	48.1	53,800
TEQs (WHO 2005 M/H)						
ND = 0; EMPC = 0	0.000103	0.0423	1.5	1.35	0.0262	0.285
ND = 0; EMPC = EMPC	0.000103	0.0425	1.5	1.35	0.0279	6.84
ND = DL/2; EMPC = 0	0.0517	0.267	1.56	1.41	0.227	1.46
ND = DL/2; EMPC = EMPC	0.0517	0.267	1.56	1.41	0.228	7.17
ND = DL; EMPC = 0	0.103	0.492	1.62	1.47	0.427	2.64
ND = DL; EMPC = EMPC	0.103	0.492	1.62	1.47	0.428	7.51
Checkcode	078-941-QHM/A	476-834-QVR/A	190-600-DSZ/A	092-443-MQQ/A	982-540-MSZ/A	798-556-JNZ/A

() = DL
[] = EMPC

PCB Report — Method 1668A

Analyte	AC95422-006	AC95422-007	AC95422-008	AC95422-009	AC95422-010	
	pg/g	pg/g	pg/g	pg/g	pg/g	
PCB-77	238	521	326	28.8	225	
PCB-81	(5.91)	12.3	7.48	(4.95)	9.37	
PCB-105	837	1,310	1,150	109	996	
PCB-114	35.6	54.3	43.6	(3.39)	35.3	
PCB-118	1,910	3,200	2,700	214	2,000	
PCB-123	55.4	64.8	56.9	7.31	55.8	
PCB-126	21.7	23.1	[15]	(3.02)	21.3	
PCB-156/157	345	377	297	21.1	273	
PCB-167	188	158	131	11.7	120	
PCB-169	(12)	(8.76)	(5.61)	(3.21)	(3.58)	
PCB-189	63.5	37.9	32.4	(2.64)	27.5	
Total Mono-CB	113	362	292	31.4	71.4	
Total Di-CB	1,080	3,230	2,520	382	694	
Total Tri-CB	3,700	10,600	8,220	773	2,500	
Total Tetra-CB	8,600	21,300	15,400	1,210	7,650	
Total Penta-CB	19,300	24,000	21,200	1,410	15,900	
Total Hexa-CB	24,900	18,600	15,900	975	12,400	
Total Hepta-CB	19,700	8,780	7,350	440	5,840	
Total Octa-CB	6,590	3,130	2,600	141	1,920	
Total Nona-CB	1,180	967	685	99.3	515	
Total Deca-CB	629	731	522	30.6	345	
TEQs (WHO 2005 M/H)						
ND = 0; EMPC = 0	2.29	2.52	0.167	0.0138	2.26	
ND = 0; EMPC = EMPC	2.29	2.52	1.67	0.0138	2.26	
ND = DL/2; EMPC = 0	2.47	2.65	0.421	0.214	2.32	
ND = DL/2; EMPC = EMPC	2.47	2.65	1.75	0.214	2.32	
ND = DL; EMPC = 0	2.66	2.78	0.675	0.413	2.37	
ND = DL; EMPC = EMPC	2.66	2.78	1.84	0.413	2.37	

Checkcode	297-823-ZGP/A	690-754-PZL/A	664-559-STZ/A	108-330-YVP/A	630-786-PXK/A

() = DL
[] = EMPC

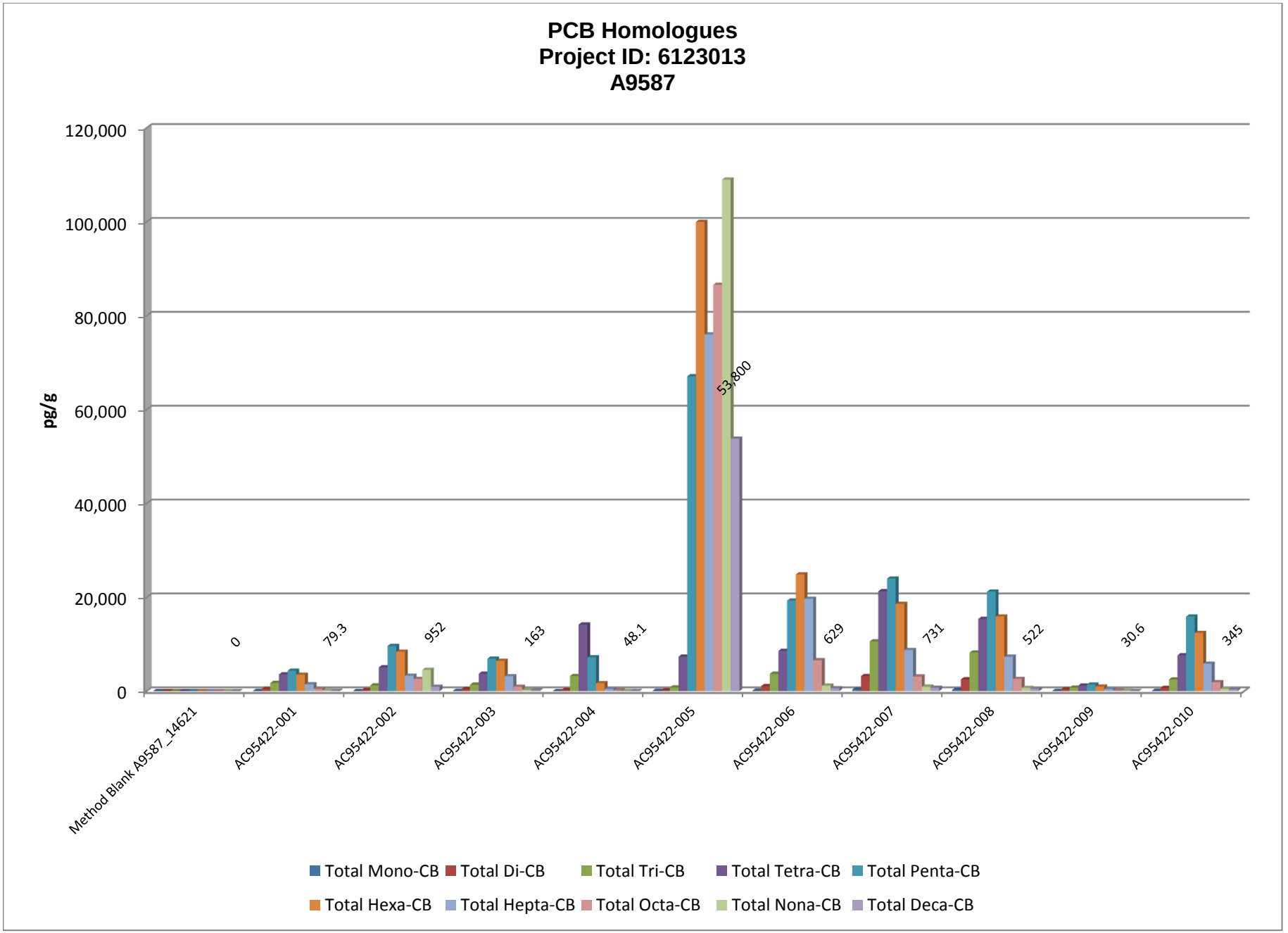
PCB Recoveries — Method 1668A

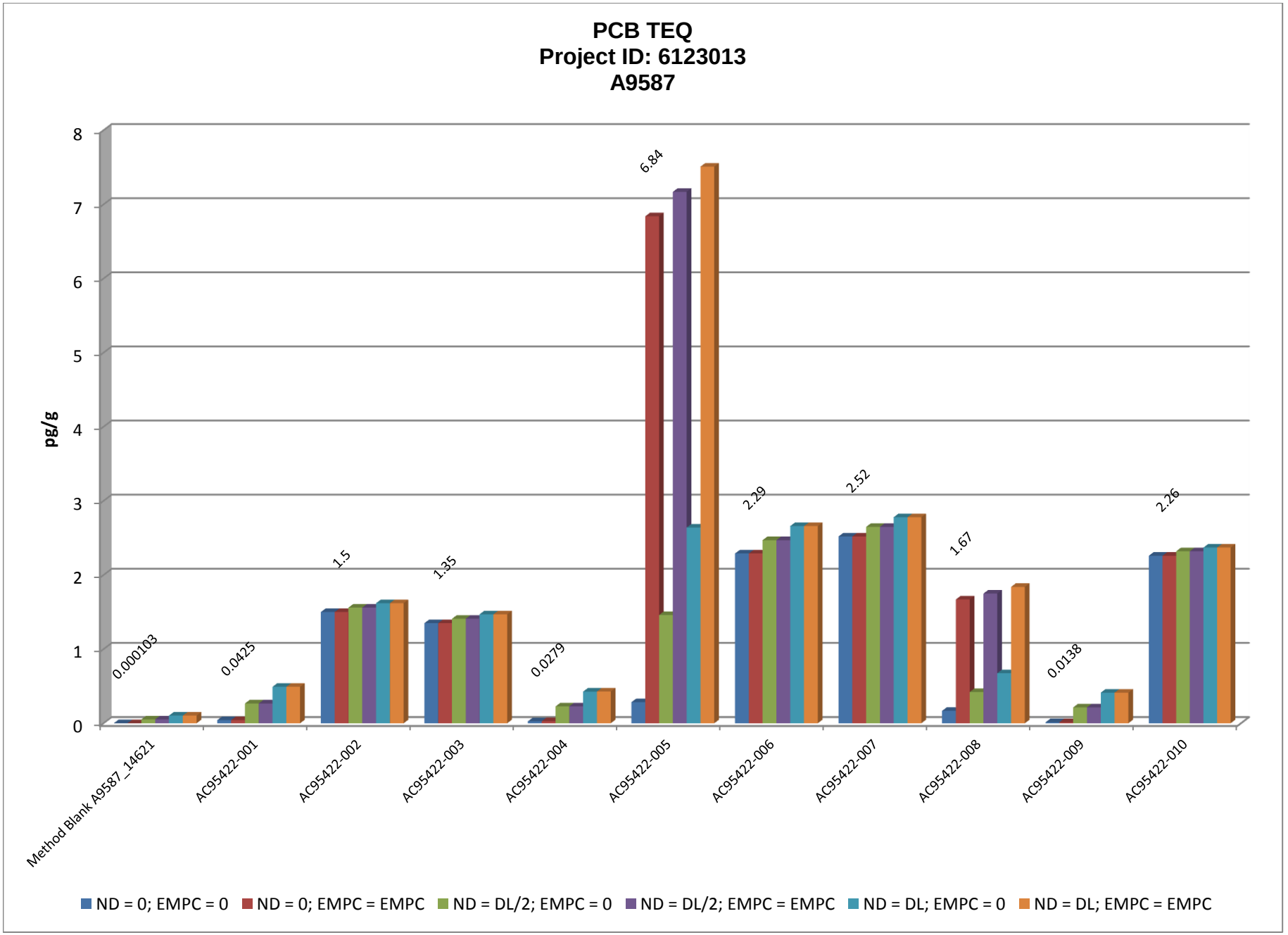
Standard	Method Blank A9587_14621	AC95422-001	AC95422-002	AC95422-003	AC95422-004	AC95422-005
ES PCB-1	59.8	60.3	56.5	61.2	52.7	65.3
ES PCB-3	59.5	60.2	58.6	66	58.2	65.5
ES PCB-4	66.7	76.5	72	77.9	74.6	79.7
ES PCB-15	78.6	83.1	84.3	88.5	91.2	87.3
ES PCB-19	73.2	80.6	78.6	85.2	85.8	83
ES PCB-39	70.6	83.4	78.9	77.1	76.7	72
ES PCB-54	63.2	77	74.8	76.2	70	76.9
ES PCB-77	94	94.1	93.2	89.1	89.5	63.6
ES PCB-81	91.6	96	94.2	89.3	93	68.6
ES PCB-104	62.5	74.5	73.7	82.7	73.8	87.2
ES PCB-105	86.9	86.3	85.6	93.1	90.2	61.5
ES PCB-114	84.3	85.7	85	90.4	89	62.3
ES PCB-118	82.9	86.9	82.9	87.8	89.6	67
ES PCB-123	81	92.3	89.8	91.2	92	75.7
ES PCB-126	94.6	84.3	90.6	91.6	99.9	58.6
ES PCB-153	83.6	85.5	83.8	90.5	91.9	84.7
ES PCB-155	69.8	77.7	79.6	82.4	86.3	94.5
ES PCB-156/157	90.4	92.9	88.1	91.2	93.5	63.6
ES PCB-167	87.3	90.1	90.5	90.1	86.4	66.3
ES PCB-169	94.7	85	82.5	72.3	98.7	57.1
ES PCB-170	85.2	92.1	95.1	106	103	114
ES PCB-180	79.6	92.2	94.4	106	112	119
ES PCB-188	68.3	67.6	74.5	79.1	75.6	73.7
ES PCB-189	89	97.5	97.5	102	102	95
ES PCB-202	84.3	81.9	83.6	94.3	84.8	73.2
ES PCB-205	86.9	92.6	71.1	97.9	77.7	88
ES PCB-206	92.7	106	110	116	117	100
ES PCB-208	90	104	102	114	111	107
ES PCB-209	97	113	114	121	119	98.9
Checkcode	078-941-QHM/A	476-834-QVR/A	190-600-DSZ/A	092-443-MQQ/A	982-540-MSZ/A	798-556-JNZ/A

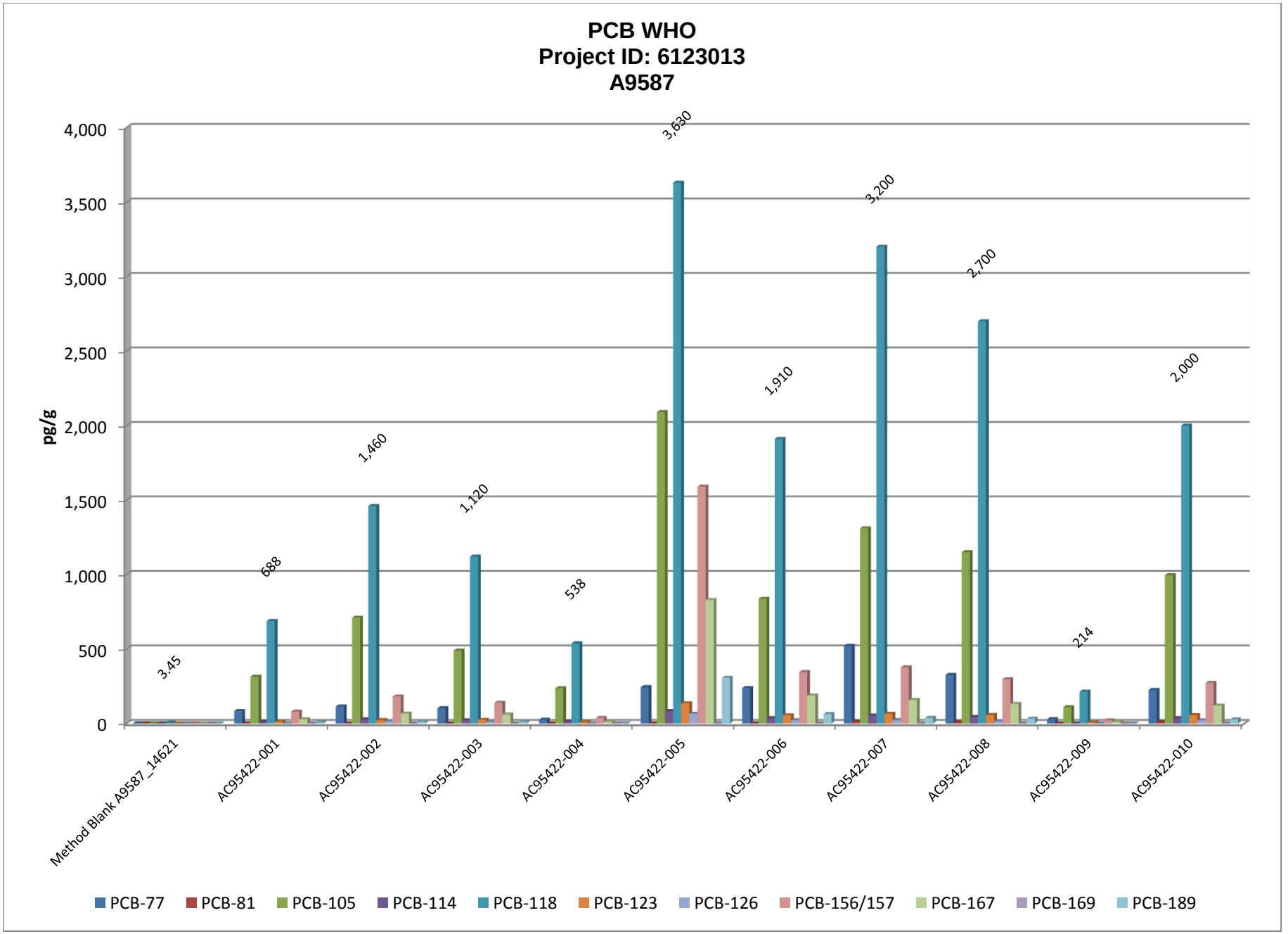
PCB Recoveries — Method 1668A

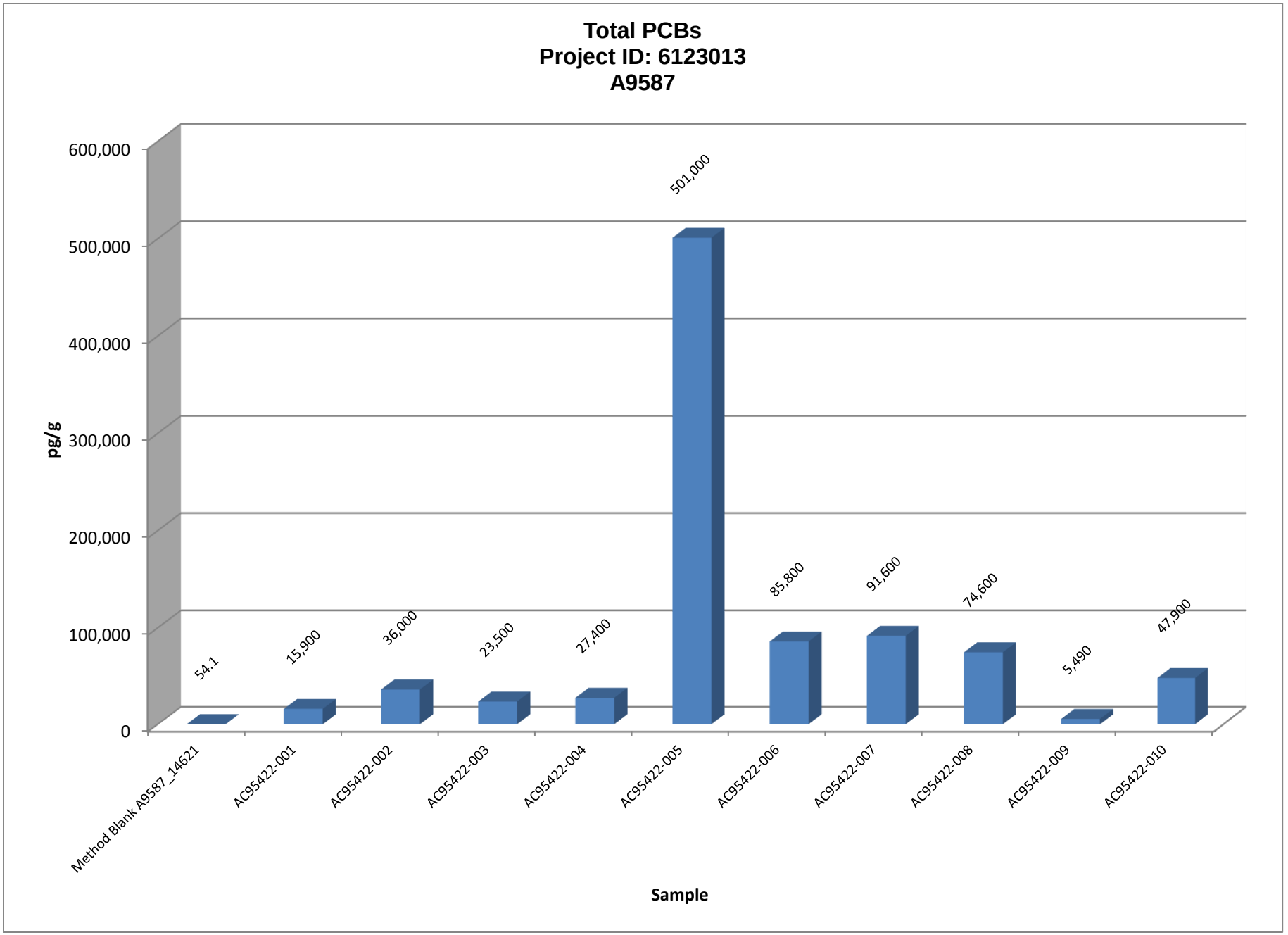
Standard	AC95422-006	AC95422-007	AC95422-008	AC95422-009	AC95422-010	
ES PCB-1	64.4	68.2	61	56.7	61.3	
ES PCB-3	69.2	71.9	67.8	60.8	65.6	
ES PCB-4	80.5	87.1	80.6	73.3	80.6	
ES PCB-15	92.7	94.5	89.6	85.3	90.4	
ES PCB-19	90.1	89.9	87.7	86.5	89.5	
ES PCB-39	72.1	79.2	78.8	77.9	81	
ES PCB-54	84	83.1	85	74.3	82.4	
ES PCB-77	78.2	77.7	88	92	90.5	
ES PCB-81	81.2	83.6	95.1	94	95.6	
ES PCB-104	103	101	90.9	87.3	85.8	
ES PCB-105	85	95.1	83.4	87	87.7	
ES PCB-114	83.2	89.5	88	92.5	90.1	
ES PCB-118	80.1	92.1	85.7	89.7	88.4	
ES PCB-123	81.8	95.4	83.2	95.1	80.8	
ES PCB-126	72.7	85.4	79.2	104	84	
ES PCB-153	90.8	94.8	93.9	96.4	100	
ES PCB-155	119	95.7	96.7	85.7	92.7	
ES PCB-156/157	83.9	81.1	84.5	89.6	96.9	
ES PCB-167	80.7	87.4	92.9	90.7	91.7	
ES PCB-169	64.1	71.5	69.7	89	80	
ES PCB-170	104	107	113	117	105	
ES PCB-180	117	112	114	112	101	
ES PCB-188	91.4	83.8	79.8	80.6	85.9	
ES PCB-189	98.9	94.7	99.7	104	101	
ES PCB-202	89.8	89.3	89.1	98.3	93.9	
ES PCB-205	104	89.3	83.3	87.7	99.9	
ES PCB-206	116	110	124	115	116	
ES PCB-208	119	106	118	114	111	
ES PCB-209	118	108	115	121	109	

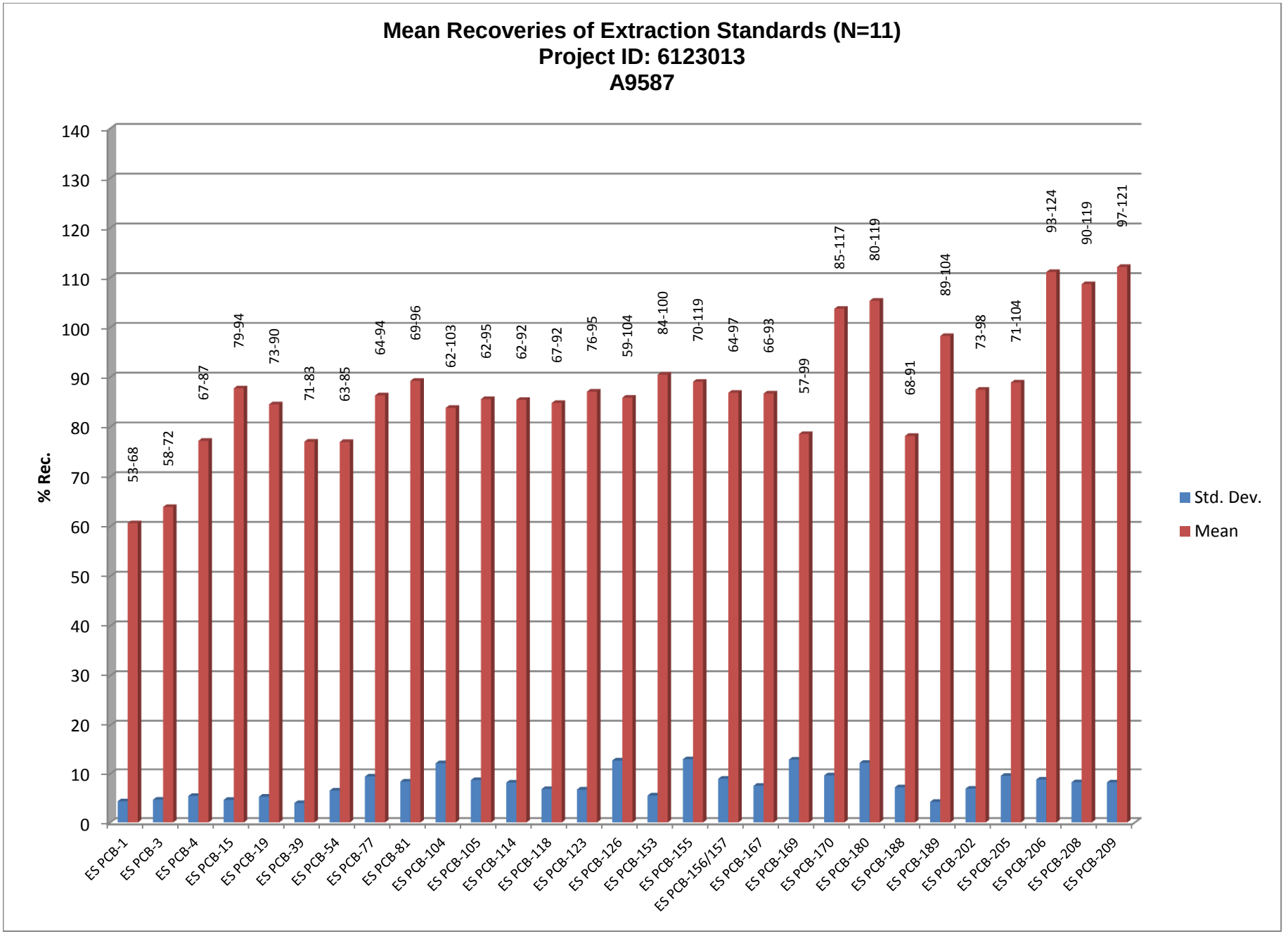
Checkcode	297-823-ZGP/A	690-754-PZL/A	664-559-STZ/A	108-330-YVP/A	630-786-PXK/A


PCB Homologues
Project ID: 6123013
A9587
pg/g
120,000
100,000
80,000
60,000
40,000
20,000
0
0
79.3
952
163
48.1
53,800
629
731
522
30.6
345
Method Blank A9587_14621
AC95422-001
AC95422-002
AC95422-003
AC95422-004
AC95422-005
AC95422-006
AC95422-007
AC95422-008
AC95422-009
AC95422-010
Total Mono-CB
Total Di-CB
Total Tri-CB
Total Tetra-CB
Total Penta-CB
Total Hexa-CB
Total Hepta-CB
Total Octa-CB
Total Nona-CB
Total Deca-CB


PCB TEQ
Project ID: 6123013
A9587
pg/g
0
1
2
3
4
5
6
7
8
0.000103
0.0425
1.5
1.35
0.0279
6.84
2.29
2.52
1.67
0.0138
2.26
Method Blank A9587_14621
AC95422-001
AC95422-002
AC95422-003
AC95422-004
AC95422-005
AC95422-006
AC95422-007
AC95422-008
AC95422-009
AC95422-010
ND = 0; EMPC = 0
ND = 0; EMPC = EMPC
ND = DL/2; EMPC = 0
ND = DL/2; EMPC = EMPC
ND = DL; EMPC = 0
ND = DL; EMPC = EMPC


PCB WHO
Project ID: 6123013
A9587
pg/g
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
3.45
688
1,460
1,120
538
3,630
1,910
3,200
2,700
214
2,000
Method Blank A9587_14621
AC95422-001
AC95422-002
AC95422-003
AC95422-004
AC95422-005
AC95422-006
AC95422-007
AC95422-008
AC95422-009
AC95422-010
PCB-77
PCB-81
PCB-105
PCB-114
PCB-118
PCB-123
PCB-126
PCB-156/157
PCB-167
PCB-169
PCB-189


Total PCBs
Project ID: 6123013
A9587
600,000
500,000
400,000
300,000
200,000
100,000
0
pg/g
54.1
15,900
36,000
23,500
27,400
501,000
85,800
91,600
74,600
5,490
47,900
Method Blank A9587_14621
AC95422-001
AC95422-002
AC95422-003
AC95422-004
AC95422-005
AC95422-006
AC95422-007
AC95422-008
AC95422-009
AC95422-010
Sample


Mean Recoveries of Extraction Standards (N=11)
Project ID: 6123013
A9587
% Rec.
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
53-68
58-72
67-87
79-94
73-90
71-83
63-85
64-94
69-96
62-103
62-95
62-92
67-92
76-95
59-104
84-100
70-119
64-97
66-93
57-99
85-117
80-119
68-91
89-104
73-98
71-104
93-124
90-119
97-121
ES PCB-1
ES PCB-3
ES PCB-4
ES PCB-15
ES PCB-19
ES PCB-39
ES PCB-54
ES PCB-77
ES PCB-81
ES PCB-104
ES PCB-105
ES PCB-114
ES PCB-118
ES PCB-123
ES PCB-126
ES PCB-153
ES PCB-155
ES PCB-156/157
ES PCB-167
ES PCB-169
ES PCB-170
ES PCB-180
ES PCB-188
ES PCB-189
ES PCB-202
ES PCB-205
ES PCB-206
ES PCB-208
ES PCB-209
Std. Dev.
Mean

Sample ID: AC95422-001

Method 1668A

Client Data		Sample Data		Laboratory Data			
Name:	Hampton-Clarke, Inc.	Matrix:	Solid	Project No.:	A9587	Date Received:	04-Jan-2017
Project ID:	6123013	Weight/Volume:	3.74 g	Sample ID:	A9587_14621_PCB_001-D2	Date Extracted:	10-Jan-2017
Date Collected:	30-Dec-2016	% Solid	15 %	QC Batch No.:	14621	Date Analyzed:	24-Jan-2017

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/g	pg/g	pg/g			%
PCB-77 33'44'-TeCB	83.8				ES PCB-1	60.3
PCB-81 344'5-TeCB	ND	4.79			ES PCB-3	60.2
PCB-105 233'44'-PeCB	314				ES PCB-4	76.5
PCB-114 2344'5-PeCB	EMPC		9.2		ES PCB-15	83.1
PCB-118 23'44'5-PeCB	688				ES PCB-19	80.6
PCB-123 23'44'5'-PeCB	12.3				ES PCB-37	83.4
PCB-126 33'44'5-PeCB	ND	3.46			ES PCB-54	77
PCB-156/157 233'44'5/233'44'5'-HxCB	79.6			C	ES PCB-77	94.1
PCB-167 23'44'55'-HxCB	28.3				ES PCB-81	96
PCB-169 33'44'55'-HxCB	ND	3.39			ES PCB-104	74.5
PCB-189 233'44'55'-HpCB	7.09				ES PCB-105	86.3
					ES PCB-114	85.7
TEQs (WHO 2005 M/H)					ES PCB-118	86.9
					ES PCB-123	92.3
ND = 0	0.0423		0.0425		ES PCB-126	84.3
ND = 0.5 x DL	0.267		0.267		ES PCB-153	85.5
ND = DL	0.492		0.492		ES PCB-155	77.7
					ES PCB-156/157	92.9
Totals					ES PCB-167	90.1
Mono-CB	35.8		48.1		ES PCB-169	85
Di-CB	466		491		ES PCB-170	92.1
Tri-CB	1,760				ES PCB-180	92.2
Tetra-CB	3,570				ES PCB-188	67.6
Penta-CB	4,360		4,410		ES PCB-189	97.5
Hexa-CB	3,500		3,560		ES PCB-202	81.9
Hepta-CB	1,470		1,500		ES PCB-205	92.6
Octa-CB	472		529		ES PCB-206	106
Nona-CB	129				ES PCB-208	104
Deca-CB	79.3				ES PCB-209	113
					CS PCB-28	86
Total PCB (Mono-Deca)	15,900		16,100		CS PCB-111	92.1
					CS PCB-178	72

Checkcode: 476-834-QVR/A SGS North America - PCB v0.66 Report Created: 25-Jan-2017 15:15 Analyst: LB

Sample ID: AC95422-001

Method 1668A

Client Data		Sample Data		Laboratory Data			
Name:	Hampton-Clarke, Inc.	Matrix:	Solid	Project No.:	A9587	Date Received:	04-Jan-2017
Project ID:	6123013	Weight/Volume:	3.74 g	Sample ID:	A9587_14621_PCB_001-D2	Date Extracted:	10-Jan-2017
Date Collected:	30-Dec-2016	% Solid	15 %	QC Batch No.:	14621	Date Analyzed:	24-Jan-2017
		Units	pg/g	Checkcode:	476-834-QVR/A	Time Analyzed:	15:57:11

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	27.9		PCB-19	22.9		PCB-54	(2.29)		PCB-72	8.03	
PCB-2	7.84		PCB-30/18	117	C	PCB-50/53	41.1	C	PCB-68	7.26	
PCB-3	[12.3]	EMPC	PCB-17	81.6		PCB-45	41.6		PCB-57	(4.41)	
			PCB-27	26.8		PCB-51	8.62		PCB-58	(4.38)	
Conc.	35.8		PCB-24	(7.25)		PCB-46	13.9		PCB-67	12.8	
EMPC	48.1		PCB-16	36.1		PCB-52	465		PCB-63	23.3	
			PCB-32	49.2		PCB-73	(2.79)		PCB-61/70/74/76	721	C
Di	**Conc.**	**Qualifiers**	PCB-34	(8.81)		PCB-43	12.1		PCB-66	616	
PCB-4	55.4		PCB-23	(8.88)		PCB-69/49	279	C	PCB-55	(4.49)	
PCB-10	6.97		PCB-26/29	79.8	C	PCB-48	46.4		PCB-56	224	
PCB-9	(5.18)		PCB-25	52.8		PCB-44/47/65	396	C	PCB-60	98.8	
PCB-7	(4.71)		PCB-31	326		PCB-59/62/75	37.7	C	PCB-80	(3.91)	
PCB-6	[24.9]	EMPC	PCB-28/20	595	C	PCB-42	109		PCB-79	(3.97)	
PCB-5	(5.04)		PCB-21/33	62.9	C	PCB-41	11.3		PCB-78	(4.62)	
PCB-8	77.2		PCB-22	113		PCB-71/40	147	C	PCB-81	(4.79)	
PCB-14	(4.34)		PCB-36	(8.31)		PCB-64	170		PCB-77	83.8	
PCB-11	78.2	B	PCB-39	(8.03)							
PCB-13/12	28.3	C	PCB-38	(8.84)							
PCB-15	220		PCB-35	(9.13)							
			PCB-37	199							
Conc.	466		**Conc.**	1,760					**Conc.**	3,570	
EMPC	491		**EMPC**	1,760					**EMPC**	3,570	

5500 Business Drive
Wilmington, NC 28405, USA
Tel: +1 910 794-1613
www.us.sgs.com

Totals	Conc.	EMPC
Mono-Tri	2,260	2,300
Tetra-Hexa	11,400	11,600
Hepta-Deca	2,150	2,240
Mono-Deca	15,900	16,100

SGS

Sample ID: AC95422-001 — Method 1668A

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(1.24)		PCB-108/119/86/97/125/87	397	C	PCB-155	(1.49)		PCB-165	(1.91)	
PCB-96	(1.32)		PCB-117	[21.1]	EMPC	PCB-152	(1.5)		PCB-146	132	
PCB-103	(4.31)		PCB-116/85	118	C	PCB-150	(1.54)		PCB-161	(1.72)	
PCB-94	(5.02)		PCB-110	839		PCB-136	76.7		PCB-153/168	713	C
PCB-95	415		PCB-115	(3.34)		PCB-145	(1.6)		PCB-141	102	
PCB-100/93	(4.62)	C	PCB-82	72.8		PCB-148	(2.23)		PCB-130	52.3	
PCB-102	17.1		PCB-111	(3.21)		PCB-151/135	236	C	PCB-137	[23.7]	EMPC
PCB-98	(5.36)		PCB-120	(3.25)		PCB-154	13.6		PCB-164	54.5	
PCB-88	(5.41)		PCB-107/124	[20.3]	EMPC C	PCB-144	21		PCB-163/138/129	943	C
PCB-91	82.9		PCB-109	58.6		PCB-147/149	586	C	PCB-160	(1.77)	
PCB-84	146		PCB-123	12.3		PCB-134	[39.8]	EMPC	PCB-158	60.6	
PCB-89	(5.2)		PCB-106	(3.41)		PCB-143	(2.33)		PCB-128/166	138	C
PCB-121	(3.37)		PCB-118	688		PCB-139/140	12	C	PCB-159	(3.07)	
PCB-92	115		PCB-122	9.68		PCB-131	9.4		PCB-162	(3.04)	
PCB-113/90/101	605	C	PCB-114	[9.2]	EMPC	PCB-142	(2.52)		PCB-167	28.3	
PCB-83	62.5		PCB-105	314		PCB-132	224		PCB-156/157	79.6	C
PCB-99	410		PCB-127	(3.52)		PCB-133	18.2		PCB-169	(3.39)	
PCB-112	(3.56)		PCB-126	(3.46)							
			Conc.	4,360					**Conc.**	3,500	
			EMPC	4,410					**EMPC**	3,560	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(1.7)		PCB-174	183		PCB-202	53		PCB-208	37.2	
PCB-179	98.3		PCB-177	127		PCB-201	20.6		PCB-207	(5.59)	
PCB-184	(1.72)		PCB-181	(3.22)		PCB-204	(2.12)		PCB-206	91.3	
PCB-176	19.7		PCB-171/173	42.9	C	PCB-197	[3.82]	EMPC			
PCB-186	(1.62)		PCB-172	[24.7]	EMPC	PCB-200	11.8		**Conc.**	129	
PCB-178	60.2		PCB-192	(2.79)		PCB-198/199	161	C	**EMPC**	129	
PCB-175	(3.34)		PCB-180/193	346	C	PCB-196	[48.3]	EMPC			
PCB-187	312		PCB-191	(2.63)		PCB-203	87.9		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(3.13)		PCB-170	149		PCB-195	42		PCB-209	79.3	
PCB-183	95.5		PCB-190	31.1		PCB-194	95.6				
PCB-185	[7.52]	EMPC	PCB-189	7.09		PCB-205	[4.72]	EMPC			
			Conc.	1,470		**Conc.**	472				
			EMPC	1,500		**EMPC**	529				

Sample ID: AC95422-002

Method 1668A

Client Data		Sample Data		Laboratory Data			
Name:	Hampton-Clarke, Inc.	Matrix:	Solid	Project No.:	A9587	Date Received:	04-Jan-2017
Project ID:	6123013	Weight/Volume:	3.65 g	Sample ID:	A9587_14621_PCB_002-D2	Date Extracted:	10-Jan-2017
Date Collected:	30-Dec-2016	% Solid	14.5 %	QC Batch No.:	14621	Date Analyzed:	24-Jan-2017

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/g	pg/g	pg/g			%
PCB-77 33'44'-TeCB	114				ES PCB-1	56.5
PCB-81 344'5-TeCB	ND	4.47			ES PCB-3	58.6
PCB-105 233'44'-PeCB	710				ES PCB-4	72
PCB-114 2344'5-PeCB	28				ES PCB-15	84.3
PCB-118 23'44'5-PeCB	1,460				ES PCB-19	78.6
PCB-123 23'44'5'-PeCB	23.1				ES PCB-37	78.9
PCB-126 33'44'5-PeCB	14.2				ES PCB-54	74.8
PCB-156/157 233'44'5/233'44'5'-HxCB	181			C	ES PCB-77	93.2
PCB-167 23'44'55'-HxCB	66.9				ES PCB-81	94.2
PCB-169 33'44'55'-HxCB	ND	3.8			ES PCB-104	73.7
PCB-189 233'44'55'-HpCB	EMPC		12.3		ES PCB-105	85.6
					ES PCB-114	85
TEQs (WHO 2005 M/H)					ES PCB-118	82.9
					ES PCB-123	89.8
ND = 0	1.5		1.5		ES PCB-126	90.6
ND = 0.5 x DL	1.56		1.56		ES PCB-153	83.8
ND = DL	1.62		1.62		ES PCB-155	79.6
					ES PCB-156/157	88.1
Totals					ES PCB-167	90.5
Mono-CB	ND	2.6			ES PCB-169	82.5
Di-CB	254				ES PCB-170	95.1
Tri-CB	1,230		1,250		ES PCB-180	94.4
Tetra-CB	5,090		5,110		ES PCB-188	74.5
Penta-CB	9,630		9,680		ES PCB-189	97.5
Hexa-CB	8,400		8,420		ES PCB-202	83.6
Hepta-CB	3,300		3,360		ES PCB-205	71.1
Octa-CB	2,600		2,600		ES PCB-206	110
Nona-CB	4,560				ES PCB-208	102
Deca-CB	952				ES PCB-209	114
					CS PCB-28	80.5
Total PCB (Mono-Deca)	36,000		36,200		CS PCB-111	87.3
					CS PCB-178	74.8

Sample ID: AC95422-002

Method 1668A

Client Data		Sample Data		Laboratory Data			
Name:	Hampton-Clarke, Inc.	Matrix:	Solid	Project No.:	A9587	Date Received:	04-Jan-2017
Project ID:	6123013	Weight/Volume:	3.65 g	Sample ID:	A9587_14621_PCB_002-D2	Date Extracted:	10-Jan-2017
Date Collected:	30-Dec-2016	% Solid	14.5 %	QC Batch No.:	14621	Date Analyzed:	24-Jan-2017
		Units	pg/g	Checkcode:	190-600-DSZ/A	Time Analyzed:	16:52:46

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	(2.43)		PCB-19	23.5		PCB-54	(2.08)		PCB-72	(3.91)	
PCB-2	(2.41)		PCB-30/18	89.1	C	PCB-50/53	75.5	C	PCB-68	8.08	
PCB-3	(2.78)		PCB-17	53.3		PCB-45	92		PCB-57	(4.11)	
			PCB-27	[18.1]	EMPC	PCB-51	[17]	EMPC	PCB-58	(4.08)	
Conc.	0		PCB-24	(9.23)		PCB-46	33.4		PCB-67	15.5	
EMPC	0		PCB-16	30.8		PCB-52	713		PCB-63	29.6	
			PCB-32	49.6		PCB-73	(2.22)		PCB-61/70/74/76	874	C
Di	**Conc.**	**Qualifiers**	PCB-34	(10.5)		PCB-43	16		PCB-66	841	
PCB-4	22.2		PCB-23	(10.6)		PCB-69/49	350	C	PCB-55	(4.19)	
PCB-10	(3.74)		PCB-26/29	36.6	C	PCB-48	68.3		PCB-56	305	
PCB-9	(5.97)		PCB-25	30		PCB-44/47/65	586	C	PCB-60	143	
PCB-7	(5.42)		PCB-31	188		PCB-59/62/75	57.1	C	PCB-80	7.87	
PCB-6	11.5		PCB-28/20	434	C	PCB-42	178		PCB-79	16.9	
PCB-5	(5.81)		PCB-21/33	53	C	PCB-41	26.6		PCB-78	(4.3)	
PCB-8	36.3		PCB-22	83.9		PCB-71/40	272	C	PCB-81	(4.47)	
PCB-14	(5)		PCB-36	(9.91)		PCB-64	269		PCB-77	114	
PCB-11	55.7	B	PCB-39	(9.58)							
PCB-13/12	14.9	C	PCB-38	(10.5)							
PCB-15	114		PCB-35	(10.9)							
			PCB-37	163							
Conc.	254		**Conc.**	1,230					**Conc.**	5,090	
EMPC	254		**EMPC**	1,250					**EMPC**	5,110	

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Totals	Conc.	EMPC
Mono-Tri	1,490	1,510
Tetra-Hexa	23,100	23,200
Hepta-Deca	11,400	11,500
Mono-Deca	36,000	36,200

SGS

Sample ID: AC95422-002 — Method 1668A

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(1.76)		PCB-108/119/86/97/125/87	973	C	PCB-155	(1.41)		PCB-165	(1.94)	
PCB-96	(1.87)		PCB-117	63.2		PCB-152	(1.42)		PCB-146	263	
PCB-103	(5.31)		PCB-116/85	271	C	PCB-150	(1.45)		PCB-161	(1.75)	
PCB-94	(6.19)		PCB-110	1,770		PCB-136	188		PCB-153/168	1,620	C
PCB-95	939		PCB-115	(4.12)		PCB-145	(1.51)		PCB-141	258	
PCB-100/93	[8.72]	EMPC C	PCB-82	195		PCB-148	(2.26)		PCB-130	119	
PCB-102	60.4		PCB-111	(3.96)		PCB-151/135	511	C	PCB-137	65.6	
PCB-98	(6.6)		PCB-120	(4)		PCB-154	[15.9]	EMPC	PCB-164	134	
PCB-88	(6.66)		PCB-107/124	48.9	C	PCB-144	56.9		PCB-163/138/129	2,190	C
PCB-91	178		PCB-109	121		PCB-147/149	1,450	C	PCB-160	(1.8)	
PCB-84	343		PCB-123	23.1		PCB-134	110		PCB-158	152	
PCB-89	[26.7]	EMPC	PCB-106	(4.2)		PCB-143	42		PCB-128/166	337	C
PCB-121	(4.15)		PCB-118	1,460		PCB-139/140	31.4	C	PCB-159	14.6	
PCB-92	234		PCB-122	[17.3]	EMPC	PCB-131	20.9		PCB-162	7.29	
PCB-113/90/101	1,300	C	PCB-114	28		PCB-142	(2.55)		PCB-167	66.9	
PCB-83	95		PCB-105	710		PCB-132	560		PCB-156/157	181	C
PCB-99	796		PCB-127	(4.37)		PCB-133	25.6		PCB-169	(3.8)	
PCB-112	(4.39)		PCB-126	14.2							
			Conc.	9,630					**Conc.**	8,400	
			EMPC	9,680					**EMPC**	8,420	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(1.36)		PCB-174	438		PCB-202	201		PCB-208	1,240	
PCB-179	192		PCB-177	253		PCB-201	76.4		PCB-207	224	
PCB-184	(1.38)		PCB-181	(2.55)		PCB-204	(1.8)		PCB-206	3,090	
PCB-176	44.1		PCB-171/173	106	C	PCB-197	11.1				
PCB-186	(1.29)		PCB-172	[51.7]	EMPC	PCB-200	67.1		**Conc.**	4,560	
PCB-178	100		PCB-192	(2.22)		PCB-198/199	1,040	C	**EMPC**	4,560	
PCB-175	(2.65)		PCB-180/193	826	C	PCB-196	179				
PCB-187	645		PCB-191	10.5		PCB-203	515		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(2.48)		PCB-170	352		PCB-195	122		PCB-209	952	
PCB-183	223		PCB-190	70.8		PCB-194	379				
PCB-185	38.4		PCB-189	[12.3]	EMPC	PCB-205	[8.82]	EMPC			
			Conc.	3,300		**Conc.**	2,600				
			EMPC	3,360		**EMPC**	2,600				

Sample ID: AC95422-003

Method 1668A

Client Data		Sample Data		Laboratory Data			
Name:	Hampton-Clarke, Inc.	Matrix:	Solid	Project No.:	A9587	Date Received:	04-Jan-2017
Project ID:	6123013	Weight/Volume:	4.47 g	Sample ID:	A9587_14621_PCB_003-D2	Date Extracted:	10-Jan-2017
Date Collected:	30-Dec-2016	% Solid	17.6 %	QC Batch No.:	14621	Date Analyzed:	24-Jan-2017

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/g	pg/g	pg/g			%
PCB-77 33'44'-TeCB	103				ES PCB-1	61.2
PCB-81 344'5-TeCB	ND	3.99			ES PCB-3	66
PCB-105 233'44'-PeCB	490				ES PCB-4	77.9
PCB-114 2344'5-PeCB	21.3				ES PCB-15	88.5
PCB-118 23'44'5-PeCB	1,120				ES PCB-19	85.2
PCB-123 23'44'5'-PeCB	24.5				ES PCB-37	77.1
PCB-126 33'44'5-PeCB	12.8				ES PCB-54	76.2
PCB-156/157 233'44'5/233'44'5'-HxCB	139			C	ES PCB-77	89.1
PCB-167 23'44'55'-HxCB	60.3				ES PCB-81	89.3
PCB-169 33'44'55'-HxCB	ND	4.06			ES PCB-104	82.7
PCB-189 233'44'55'-HpCB	EMPC		11.6		ES PCB-105	93.1
					ES PCB-114	90.4
TEQs (WHO 2005 M/H)					ES PCB-118	87.8
					ES PCB-123	91.2
ND = 0	1.35		1.35		ES PCB-126	91.6
ND = 0.5 x DL	1.41		1.41		ES PCB-153	90.5
ND = DL	1.47		1.47		ES PCB-155	82.4
					ES PCB-156/157	91.2
Totals					ES PCB-167	90.1
Mono-CB	44.1		58.4		ES PCB-169	72.3
Di-CB	431		485		ES PCB-170	106
Tri-CB	1,400				ES PCB-180	106
Tetra-CB	3,720		3,740		ES PCB-188	79.1
Penta-CB	6,920		6,930		ES PCB-189	102
Hexa-CB	6,450				ES PCB-202	94.3
Hepta-CB	3,170		3,200		ES PCB-205	97.9
Octa-CB	944				ES PCB-206	116
Nona-CB	253				ES PCB-208	114
Deca-CB	163				ES PCB-209	121
					CS PCB-28	75.6
Total PCB (Mono-Deca)	23,500		23,600		CS PCB-111	90.6
					CS PCB-178	85.7

Checkcode: 092-443-MQQ/A SGS North America - PCB v0.66 Report Created: 25-Jan-2017 15:15 Analyst: LB

Sample ID: AC95422-003

Method 1668A

Client Data		Sample Data		Laboratory Data			
Name:	Hampton-Clarke, Inc.	Matrix:	Solid	Project No.:	A9587	Date Received:	04-Jan-2017
Project ID:	6123013	Weight/Volume:	4.47 g	Sample ID:	A9587_14621_PCB_003-D2	Date Extracted:	10-Jan-2017
Date Collected:	30-Dec-2016	% Solid	17.6 %	QC Batch No.:	14621	Date Analyzed:	24-Jan-2017
		Units	pg/g	Checkcode:	092-443-MQQ/A	Time Analyzed:	17:48:24

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	32.2		PCB-19	(10.2)		PCB-54	(1.77)		PCB-72	9.5	
PCB-2	11.9		PCB-30/18	93.7	C	PCB-50/53	31.8	C	PCB-68	7.47	
PCB-3	[14.3]	EMPC	PCB-17	67.6		PCB-45	34		PCB-57	(3.68)	
			PCB-27	17.7		PCB-51	7.3		PCB-58	(3.65)	
Conc.	44.1		PCB-24	(7.53)		PCB-46	10.7		PCB-67	[10.7]	EMPC
EMPC	58.4		PCB-16	34.9		PCB-52	563		PCB-63	24.9	
			PCB-32	50.9		PCB-73	(1.97)		PCB-61/70/74/76	773	C
Di	**Conc.**	**Qualifiers**	PCB-34	(9.16)		PCB-43	[7.07]	EMPC	PCB-66	669	
PCB-4	[54]	EMPC	PCB-23	(9.23)		PCB-69/49	298	C	PCB-55	(3.74)	
PCB-10	5.76		PCB-26/29	66.4	C	PCB-48	35.6		PCB-56	226	
PCB-9	(3.16)		PCB-25	43.3		PCB-44/47/65	337	C	PCB-60	103	
PCB-7	(2.87)		PCB-31	273		PCB-59/62/75	35.7	C	PCB-80	(3.25)	
PCB-6	25.6		PCB-28/20	420	C	PCB-42	88.3		PCB-79	10.3	
PCB-5	(3.07)		PCB-21/33	60.2	C	PCB-41	12.8		PCB-78	(3.85)	
PCB-8	77.4		PCB-22	84.1		PCB-71/40	148	C	PCB-81	(3.99)	
PCB-14	(2.64)		PCB-36	(8.64)		PCB-64	196		PCB-77	103	
PCB-11	90.1	B	PCB-39	(8.35)							
PCB-13/12	30	C	PCB-38	(9.19)							
PCB-15	202		PCB-35	(9.49)							
			PCB-37	184							
Conc.	431		**Conc.**	1,400					**Conc.**	3,720	
EMPC	485		**EMPC**	1,400					**EMPC**	3,740	

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Totals	Conc.	EMPC
Mono-Tri	1,870	1,940
Tetra-Hexa	17,100	17,100
Hepta-Deca	4,530	4,560
Mono-Deca	23,500	23,600

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Sample ID: AC95422-003 — Method 1668A

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(1.33)		PCB-108/119/86/97/125/87	597	C	PCB-155	(0.925)		PCB-165	(0.95)	
PCB-96	(1.41)		PCB-117	42.4		PCB-152	(0.934)		PCB-146	233	
PCB-103	7.94		PCB-116/85	178	C	PCB-150	(0.954)		PCB-161	(0.856)	
PCB-94	[6.47]	EMPC	PCB-110	1,370		PCB-136	125		PCB-153/168	1,310	C
PCB-95	615		PCB-115	(2.19)		PCB-145	(0.991)		PCB-141	196	
PCB-100/93	[8.67]	EMPC C	PCB-82	99.4		PCB-148	(1.11)		PCB-130	95	
PCB-102	27		PCB-111	(2.11)		PCB-151/135	426	C	PCB-137	50.1	
PCB-98	(3.51)		PCB-120	(2.13)		PCB-154	20.8		PCB-164	96.2	
PCB-88	(3.54)		PCB-107/124	43.8	C	PCB-144	42		PCB-163/138/129	1,690	C
PCB-91	118		PCB-109	96.1		PCB-147/149	1,050	C	PCB-160	(0.881)	
PCB-84	181		PCB-123	24.5		PCB-134	66.1		PCB-158	118	
PCB-89	12		PCB-106	(2.23)		PCB-143	19.7		PCB-128/166	250	C
PCB-121	(2.21)		PCB-118	1,120		PCB-139/140	18	C	PCB-159	11.2	
PCB-92	193		PCB-122	15.5		PCB-131	13		PCB-162	(3.1)	
PCB-113/90/101	988	C	PCB-114	21.3		PCB-142	(1.25)		PCB-167	60.3	
PCB-83	78.4		PCB-105	490		PCB-132	392		PCB-156/157	139	C
PCB-99	584		PCB-127	(2.6)		PCB-133	23.7		PCB-169	(4.06)	
PCB-112	(2.33)		PCB-126	12.8							
			Conc.	6,920					**Conc.**	6,450	
			EMPC	6,930					**EMPC**	6,450	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(1.14)		PCB-174	398		PCB-202	73.9		PCB-208	71.1	
PCB-179	164		PCB-177	270		PCB-201	30.7		PCB-207	15.6	
PCB-184	(1.16)		PCB-181	(3.04)		PCB-204	(1.33)		PCB-206	166	
PCB-176	41.1		PCB-171/173	107	C	PCB-197	9.87				
PCB-186	(1.09)		PCB-172	60.9		PCB-200	25.3		**Conc.**	253	
PCB-178	99.7		PCB-192	(2.64)		PCB-198/199	249	C	**EMPC**	253	
PCB-175	15.6		PCB-180/193	756	C	PCB-196	91				
PCB-187	629		PCB-191	[12.2]	EMPC	PCB-203	157		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(2.95)		PCB-170	327		PCB-195	83.6		PCB-209	163	
PCB-183	208		PCB-190	60.1		PCB-194	212				
PCB-185	36.8		PCB-189	[11.6]	EMPC	PCB-205	11.2				
			Conc.	3,170		**Conc.**	944				
			EMPC	3,200		**EMPC**	944				

Sample ID: AC95422-004

Method 1668A

Client Data		Sample Data		Laboratory Data			
Name:	Hampton-Clarke, Inc.	Matrix:	Solid	Project No.:	A9587	Date Received:	04-Jan-2017
Project ID:	6123013	Weight/Volume:	3.12 g	Sample ID:	A9587_14621_PCB_004-D2	Date Extracted:	10-Jan-2017
Date Collected:	30-Dec-2016	% Solid	12.2 %	QC Batch No.:	14621	Date Analyzed:	24-Jan-2017

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/g	pg/g	pg/g			%
PCB-77 33'44'-TeCB	25.6				ES PCB-1	52.7
PCB-81 344'5-TeCB	ND	5.11			ES PCB-3	58.2
PCB-105 233'44'-PeCB	237				ES PCB-4	74.6
PCB-114 2344'5-PeCB	12				ES PCB-15	91.2
PCB-118 23'44'5-PeCB	538				ES PCB-19	85.8
PCB-123 23'44'5'-PeCB	EMPC		8.73		ES PCB-37	76.7
PCB-126 33'44'5-PeCB	ND	3.22			ES PCB-54	70
PCB-156/157 233'44'5/233'44'5'-HxCB	EMPC		37	C	ES PCB-77	89.5
PCB-167 23'44'55'-HxCB	EMPC		12		ES PCB-81	93
PCB-169 33'44'55'-HxCB	ND	2.56			ES PCB-104	73.8
PCB-189 233'44'55'-HpCB	ND	2.62			ES PCB-105	90.2
					ES PCB-114	89
TEQs (WHO 2005 M/H)					ES PCB-118	89.6
					ES PCB-123	92
ND = 0	0.0262		0.0279		ES PCB-126	99.9
ND = 0.5 x DL	0.227		0.228		ES PCB-153	91.9
ND = DL	0.427		0.428		ES PCB-155	86.3
					ES PCB-156/157	93.5
Totals					ES PCB-167	86.4
Mono-CB	ND	4.72			ES PCB-169	98.7
Di-CB	276				ES PCB-170	103
Tri-CB	3,230		3,280		ES PCB-180	112
Tetra-CB	14,200				ES PCB-188	75.6
Penta-CB	7,230		7,280		ES PCB-189	102
Hexa-CB	1,710		1,820		ES PCB-202	84.8
Hepta-CB	486				ES PCB-205	77.7
Octa-CB	150		179		ES PCB-206	117
Nona-CB	29.2				ES PCB-208	111
Deca-CB	48.1				ES PCB-209	119
					CS PCB-28	75.8
Total PCB (Mono-Deca)	27,400		27,600		CS PCB-111	93.9
					CS PCB-178	86.7

Checkcode: 982-540-MSZ/A SGS North America - PCB v0.66 Report Created: 25-Jan-2017 15:15 Analyst: LB

Sample ID: AC95422-004

Method 1668A

Client Data		Sample Data		Laboratory Data			
Name:	Hampton-Clarke, Inc.	Matrix:	Solid	Project No.:	A9587	Date Received:	04-Jan-2017
Project ID:	6123013	Weight/Volume:	3.12 g	Sample ID:	A9587_14621_PCB_004-D2	Date Extracted:	10-Jan-2017
Date Collected:	30-Dec-2016	% Solid	12.2 %	QC Batch No.:	14621	Date Analyzed:	24-Jan-2017
		Units	pg/g	Checkcode:	982-540-MSZ/A	Time Analyzed:	18:44:01

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	(4.57)		PCB-19	86		PCB-54	(2.96)		PCB-72	(4.48)	
PCB-2	(4.23)		PCB-30/18	721	C	PCB-50/53	224	C	PCB-68	(4.26)	
PCB-3	(4.87)		PCB-17	226		PCB-45	124		PCB-57	(4.71)	
			PCB-27	[49.9]	EMPC	PCB-51	10.9		PCB-58	(4.67)	
Conc.	0		PCB-24	(13.2)		PCB-46	42.6		PCB-67	(4.44)	
EMPC	0		PCB-16	317		PCB-52	7,500		PCB-63	13.2	
			PCB-32	208		PCB-73	(2.91)		PCB-61/70/74/76	1,410	C
Di	**Conc.**	**Qualifiers**	PCB-34	(13.2)		PCB-43	22.7		PCB-66	493	
PCB-4	43.3		PCB-23	(13.3)		PCB-69/49	840	C	PCB-55	(4.79)	
PCB-10	(8.3)		PCB-26/29	68.1	C	PCB-48	80.9		PCB-56	165	
PCB-9	(5.99)		PCB-25	37.2		PCB-44/47/65	2,190	C	PCB-60	65.5	
PCB-7	(5.44)		PCB-31	497		PCB-59/62/75	35.3	C	PCB-80	(4.17)	
PCB-6	12.9		PCB-28/20	563	C	PCB-42	124		PCB-79	10.5	
PCB-5	(5.83)		PCB-21/33	233	C	PCB-41	12.6		PCB-78	(4.93)	
PCB-8	54.7		PCB-22	160		PCB-71/40	376	C	PCB-81	(5.11)	
PCB-14	(5.02)		PCB-36	(12.4)		PCB-64	466		PCB-77	25.6	
PCB-11	25.4	B	PCB-39	(12)							
PCB-13/12	14.4	C	PCB-38	(13.2)							
PCB-15	126		PCB-35	(13.6)							
			PCB-37	109							
Conc.	276		**Conc.**	3,230					**Conc.**	14,200	
EMPC	276		**EMPC**	3,280					**EMPC**	14,200	

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Totals	Conc.	EMPC
Mono-Tri	3,500	3,550
Tetra-Hexa	23,200	23,300
Hepta-Deca	713	742
Mono-Deca	27,400	27,600

Sample ID: AC95422-004 — Method 1668A

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(1.78)		PCB-108/119/86/97/125/87	680	C	PCB-155	(1.44)		PCB-165	(1.65)	
PCB-96	(1.89)		PCB-117	22.2		PCB-152	(1.45)		PCB-146	49.7	
PCB-103	(4.99)		PCB-116/85	121	C	PCB-150	(1.48)		PCB-161	(1.49)	
PCB-94	(5.82)		PCB-110	1,120		PCB-136	71.6		PCB-153/168	298	C
PCB-95	1,920		PCB-115	(3.87)		PCB-145	(1.54)		PCB-141	66.1	
PCB-100/93	(5.35)	C	PCB-82	95.3		PCB-148	(1.93)		PCB-130	[24.1]	EMPC
PCB-102	[21.5]	EMPC	PCB-111	(3.72)		PCB-151/135	131	C	PCB-137	18.1	
PCB-98	(6.21)		PCB-120	(3.76)		PCB-154	(1.77)		PCB-164	26.8	
PCB-88	(6.26)		PCB-107/124	[20]	EMPC C	PCB-144	17.5		PCB-163/138/129	426	C
PCB-91	137		PCB-109	35.9		PCB-147/149	331	C	PCB-160	(1.53)	
PCB-84	530		PCB-123	[8.73]	EMPC	PCB-134	32.3		PCB-158	[29.7]	EMPC
PCB-89	(6.02)		PCB-106	(3.95)		PCB-143	(2.01)		PCB-128/166	79.8	C
PCB-121	(3.9)		PCB-118	538		PCB-139/140	11.8	C	PCB-159	(2.75)	
PCB-92	207		PCB-122	(4.45)		PCB-131	(2.22)		PCB-162	(2.72)	
PCB-113/90/101	1,090	C	PCB-114	12		PCB-142	(2.18)		PCB-167	[12]	EMPC
PCB-83	59.8		PCB-105	237		PCB-132	148		PCB-156/157	[37]	EMPC C
PCB-99	424		PCB-127	(4.43)		PCB-133	6.02		PCB-169	(2.56)	
PCB-112	(4.13)		PCB-126	(3.22)							
			Conc.	7,230					**Conc.**	1,710	
			EMPC	7,280					**EMPC**	1,820	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(1.97)		PCB-174	64.5		PCB-202	11.2		PCB-208	8.46	
PCB-179	32.1		PCB-177	38.8		PCB-201	5.01		PCB-207	(5.13)	
PCB-184	(1.99)		PCB-181	(2.88)		PCB-204	(1.89)		PCB-206	20.8	
PCB-176	6.85		PCB-171/173	15.2	C	PCB-197	(1.81)				
PCB-186	(1.87)		PCB-172	10.7		PCB-200	5.91		**Conc.**	29.2	
PCB-178	16.8		PCB-192	(2.5)		PCB-198/199	53.6	C	**EMPC**	29.2	
PCB-175	(2.99)		PCB-180/193	113	C	PCB-196	[14.8]	EMPC			
PCB-187	86.8		PCB-191	(2.36)		PCB-203	26		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(2.8)		PCB-170	50.8		PCB-195	[14.6]	EMPC	PCB-209	48.1	
PCB-183	35.5		PCB-190	12.1		PCB-194	48.1				
PCB-185	2.8	J	PCB-189	(2.62)		PCB-205	(4.64)				
			Conc.	486		**Conc.**	150				
			EMPC	486		**EMPC**	179				

Sample ID: AC95422-005

Method 1668A

Client Data		Sample Data		Laboratory Data			
Name:	Hampton-Clarke, Inc.	Matrix:	Solid	Project No.:	A9587	Date Received:	04-Jan-2017
Project ID:	6123013	Weight/Volume:	5.26 g	Sample ID:	A9587_14621_PCB_005-D2	Date Extracted:	10-Jan-2017
Date Collected:	30-Dec-2016	% Solid	33.2 %	QC Batch No.:	14621	Date Analyzed:	24-Jan-2017

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/g	pg/g	pg/g			%
PCB-77 33'44'-TeCB	244				ES PCB-1	65.3
PCB-81 344'5-TeCB	ND	10.6			ES PCB-3	65.5
PCB-105 233'44'-PeCB	2,090				ES PCB-4	79.7
PCB-114 2344'5-PeCB	83.3				ES PCB-15	87.3
PCB-118 23'44'5-PeCB	3,630				ES PCB-19	83
PCB-123 23'44'5'-PeCB	136				ES PCB-37	72
PCB-126 33'44'5-PeCB	EMPC		65.5		ES PCB-54	76.9
PCB-156/157 233'44'5/233'44'5'-HxCB	1,590			C	ES PCB-77	63.6
PCB-167 23'44'55'-HxCB	829				ES PCB-81	68.6
PCB-169 33'44'55'-HxCB	ND	22.3			ES PCB-104	87.2
PCB-189 233'44'55'-HpCB	307				ES PCB-105	61.5
					ES PCB-114	62.3
TEQs (WHO 2005 M/H)					ES PCB-118	67
					ES PCB-123	75.7
ND = 0	0.285		6.84		ES PCB-126	58.6
ND = 0.5 x DL	1.46		7.17		ES PCB-153	84.7
ND = DL	2.64		7.51		ES PCB-155	94.5
					ES PCB-156/157	63.6
Totals					ES PCB-167	66.3
Mono-CB	59.4				ES PCB-169	57.1
Di-CB	199		248		ES PCB-170	114
Tri-CB	809				ES PCB-180	119
Tetra-CB	7,370		7,420		ES PCB-188	73.7
Penta-CB	67,100		67,300		ES PCB-189	95
Hexa-CB	100,000				ES PCB-202	73.2
Hepta-CB	76,000				ES PCB-205	88
Octa-CB	86,600		86,600		ES PCB-206	100
Nona-CB	109,000				ES PCB-208	107
Deca-CB	53,800			E	ES PCB-209	98.9
					CS PCB-28	76.1
Total PCB (Mono-Deca)	501,000		502,000		CS PCB-111	92.9
					CS PCB-178	65.9

Checkcode: 798-556-JNZ/A SGS North America - PCB v0.66 Report Created: 25-Jan-2017 15:15 Analyst: LB

Sample ID: AC95422-005

Method 1668A

Client Data		Sample Data		Laboratory Data			
Name:	Hampton-Clarke, Inc.	Matrix:	Solid	Project No.:	A9587	Date Received:	04-Jan-2017
Project ID:	6123013	Weight/Volume:	5.26 g	Sample ID:	A9587_14621_PCB_005-D2	Date Extracted:	10-Jan-2017
Date Collected:	30-Dec-2016	% Solid	33.2 %	QC Batch No.:	14621	Date Analyzed:	24-Jan-2017
		Units	pg/g	Checkcode:	798-556-JNZ/A	Time Analyzed:	19:39:38

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	26.6		PCB-19	(15.6)		PCB-54	(3.05)		PCB-72	(9.32)	
PCB-2	(3.12)		PCB-30/18	72.5	C	PCB-50/53	340	C	PCB-68	(8.86)	
PCB-3	32.8		PCB-17	35.5		PCB-45	294		PCB-57	(9.8)	
			PCB-27	15.1		PCB-51	63		PCB-58	(9.73)	
Conc.	59.4		PCB-24	(11.5)		PCB-46	121		PCB-67	(9.24)	
EMPC	59.4		PCB-16	38.6		PCB-52	1,840		PCB-63	16.3	
			PCB-32	30.9		PCB-73	(3.55)		PCB-61/70/74/76	1,320	C
Di	**Conc.**	**Qualifiers**	PCB-34	(14.9)		PCB-43	16.1		PCB-66	634	
PCB-4	18.5		PCB-23	(15)		PCB-69/49	400	C	PCB-55	(9.98)	
PCB-10	(6.74)		PCB-26/29	(14.8)	C	PCB-48	53.6		PCB-56	272	
PCB-9	(8.08)		PCB-25	(14.3)		PCB-44/47/65	686	C	PCB-60	117	
PCB-7	(7.34)		PCB-31	145		PCB-59/62/75	164	C	PCB-80	41.9	
PCB-6	10.5		PCB-28/20	191	C	PCB-42	122		PCB-79	[52.8]	EMPC
PCB-5	(7.86)		PCB-21/33	70.1	C	PCB-41	24.9		PCB-78	(10.3)	
PCB-8	[49.4]	EMPC	PCB-22	55.6		PCB-71/40	277	C	PCB-81	(10.6)	
PCB-14	(6.77)		PCB-36	(14)		PCB-64	326		PCB-77	244	
PCB-11	48.7	B	PCB-39	(13.5)							
PCB-13/12	18.7	C	PCB-38	(14.9)							
PCB-15	103		PCB-35	(15.4)							
			PCB-37	155							
Conc.	199		**Conc.**	809					**Conc.**	7,370	
EMPC	248		**EMPC**	809					**EMPC**	7,420	

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Totals	Conc.	EMPC
Mono-Tri	1,070	1,120
Tetra-Hexa	175,000	175,000
Hepta-Deca	326,000	326,000
Mono-Deca	501,000	502,000

Sample ID: AC95422-005 — Method 1668A

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(1.99)		PCB-108/119/86/97/125/87	4,110	C	PCB-155	(2.41)		PCB-165	39.1	
PCB-96	80.4		PCB-117	339		PCB-152	17.6		PCB-146	3,130	
PCB-103	79.6		PCB-116/85	945	C	PCB-150	25.7		PCB-161	(3.53)	
PCB-94	[68.8]	EMPC	PCB-110	21,100	E	PCB-136	2,390		PCB-153/168	16,000	E C
PCB-95	14,000	E	PCB-115	(18.2)		PCB-145	(2.59)		PCB-141	3,980	
PCB-100/93	83.4	C	PCB-82	1,160		PCB-148	(4.57)		PCB-130	1,530	
PCB-102	403		PCB-111	(17.5)		PCB-151/135	8,240	C	PCB-137	841	
PCB-98	(29.1)		PCB-120	(17.7)		PCB-154	201		PCB-164	1,690	
PCB-88	(29.4)		PCB-107/124	219	C	PCB-144	1,190		PCB-163/138/129	21,400	C
PCB-91	2,110		PCB-109	367		PCB-147/149	19,400	E C	PCB-160	(3.64)	
PCB-84	4,500		PCB-123	136		PCB-134	1,490		PCB-158	2,140	
PCB-89	159		PCB-106	(18.5)		PCB-143	(4.77)		PCB-128/166	4,680	C
PCB-121	(18.3)		PCB-118	3,630		PCB-139/140	423	C	PCB-159	278	
PCB-92	1,990		PCB-122	121		PCB-131	344		PCB-162	118	
PCB-113/90/101	6,080	C	PCB-114	83.3		PCB-142	(5.17)		PCB-167	829	
PCB-83	814		PCB-105	2,090		PCB-132	7,740	E	PCB-156/157	1,590	C
PCB-99	2,600		PCB-127	(20.9)		PCB-133	328		PCB-169	(22.3)	
PCB-112	(19.4)		PCB-126	[65.5]	EMPC						
			Conc.	67,100					**Conc.**	100,000	
			EMPC	67,300					**EMPC**	100,000	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	28.4		PCB-174	10,200	E	PCB-202	8,550	E	PCB-208	29,900	E
PCB-179	3,300		PCB-177	5,240		PCB-201	2,460		PCB-207	6,500	
PCB-184	(2.41)		PCB-181	(17)		PCB-204	[7.03]	EMPC	PCB-206	73,000	E
PCB-176	814		PCB-171/173	2,420	C	PCB-197	225				
PCB-186	(2.26)		PCB-172	1,460		PCB-200	1,830		**Conc.**	109,000	
PCB-178	1,580		PCB-192	(14.8)		PCB-198/199	32,100	E C	**EMPC**	109,000	
PCB-175	386		PCB-180/193	18,500	E C	PCB-196	4,620				
PCB-187	16,700	E	PCB-191	258		PCB-203	20,700	E	**Deca**	**Conc.**	**Qualifiers**
PCB-182	(16.5)		PCB-170	6,870		PCB-195	2,490		PCB-209	53,800	E
PCB-183	5,700		PCB-190	1,310		PCB-194	13,400	E			
PCB-185	889		PCB-189	307		PCB-205	277				
			Conc.	76,000		**Conc.**	86,600				
			EMPC	76,000		**EMPC**	86,600				

Sample ID: AC95422-006

Method 1668A

Client Data		Sample Data		Laboratory Data			
Name:	Hampton-Clarke, Inc.	Matrix:	Solid	Project No.:	A9587	Date Received:	04-Jan-2017
Project ID:	6123013	Weight/Volume:	4.92 g	Sample ID:	A9587_14621_PCB_006-D2	Date Extracted:	10-Jan-2017
Date Collected:	30-Dec-2016	% Solid	34.8 %	QC Batch No.:	14621	Date Analyzed:	24-Jan-2017

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/g	pg/g	pg/g			%
PCB-77 33'44'-TeCB	238				ES PCB-1	64.4
PCB-81 344'5-TeCB	ND	5.91			ES PCB-3	69.2
PCB-105 233'44'-PeCB	837				ES PCB-4	80.5
PCB-114 2344'5-PeCB	35.6				ES PCB-15	92.7
PCB-118 23'44'5-PeCB	1,910				ES PCB-19	90.1
PCB-123 23'44'5'-PeCB	55.4				ES PCB-37	72.1
PCB-126 33'44'5-PeCB	21.7				ES PCB-54	84
PCB-156/157 233'44'5/233'44'5'-HxCB	345			C	ES PCB-77	78.2
PCB-167 23'44'55'-HxCB	188				ES PCB-81	81.2
PCB-169 33'44'55'-HxCB	ND	12			ES PCB-104	103
PCB-189 233'44'55'-HpCB	63.5				ES PCB-105	85
					ES PCB-114	83.2
TEQs (WHO 2005 M/H)					ES PCB-118	80.1
					ES PCB-123	81.8
ND = 0	2.29		2.29		ES PCB-126	72.7
ND = 0.5 x DL	2.47		2.47		ES PCB-153	90.8
ND = DL	2.66		2.66		ES PCB-155	119
					ES PCB-156/157	83.9
Totals					ES PCB-167	80.7
Mono-CB	113				ES PCB-169	64.1
Di-CB	1,080		1,130		ES PCB-170	104
Tri-CB	3,700				ES PCB-180	117
Tetra-CB	8,600		8,650		ES PCB-188	91.4
Penta-CB	19,300				ES PCB-189	98.9
Hexa-CB	24,900		24,900		ES PCB-202	89.8
Hepta-CB	19,700		19,800		ES PCB-205	104
Octa-CB	6,590				ES PCB-206	116
Nona-CB	1,180				ES PCB-208	119
Deca-CB	629				ES PCB-209	118
					CS PCB-28	84.5
Total PCB (Mono-Deca)	85,800		86,100		CS PCB-111	92.3
					CS PCB-178	86.8

Sample ID: AC95422-006

Method 1668A

Client Data		Sample Data		Laboratory Data			
Name:	Hampton-Clarke, Inc.	Matrix:	Solid	Project No.:	A9587	Date Received:	04-Jan-2017
Project ID:	6123013	Weight/Volume:	4.92 g	Sample ID:	A9587_14621_PCB_006-D2	Date Extracted:	10-Jan-2017
Date Collected:	30-Dec-2016	% Solid	34.8 %	QC Batch No.:	14621	Date Analyzed:	24-Jan-2017
		Units	pg/g	Checkcode:	297-823-ZGP/A	Time Analyzed:	20:35:14

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	61.3		PCB-19	28.5		PCB-54	(1.71)		PCB-72	[14.7]	EMPC
PCB-2	19.1		PCB-30/18	237	C	PCB-50/53	127	C	PCB-68	15.5	
PCB-3	32.4		PCB-17	155		PCB-45	105		PCB-57	(5.44)	
			PCB-27	40.6		PCB-51	28.5		PCB-58	(5.4)	
Conc.	113		PCB-24	(6.87)		PCB-46	[29]	EMPC	PCB-67	25.6	
EMPC	113		PCB-16	84.2		PCB-52	1,480		PCB-63	38.7	
			PCB-32	120		PCB-73	[4.6]	EMPC	PCB-61/70/74/76	1,540	C
Di	**Conc.**	**Qualifiers**	PCB-34	(7.41)		PCB-43	23.7		PCB-66	1,360	
PCB-4	123		PCB-23	(7.47)		PCB-69/49	701	C	PCB-55	9.5	
PCB-10	12.7		PCB-26/29	210	C	PCB-48	98.9		PCB-56	482	
PCB-9	9.87		PCB-25	118		PCB-44/47/65	914	C	PCB-60	181	
PCB-7	4.16		PCB-31	735		PCB-59/62/75	93.5	C	PCB-80	(4.82)	
PCB-6	[49.2]	EMPC	PCB-28/20	1,120	C	PCB-42	302		PCB-79	21.8	
PCB-5	(2.3)		PCB-21/33	167	C	PCB-41	28.7		PCB-78	(5.69)	
PCB-8	176		PCB-22	198		PCB-71/40	404	C	PCB-81	(5.91)	
PCB-14	(1.98)		PCB-36	(6.99)		PCB-64	379		PCB-77	238	
PCB-11	234		PCB-39	(6.75)							
PCB-13/12	63.3	C	PCB-38	(7.43)							
PCB-15	455		PCB-35	42.8							
			PCB-37	444							
Conc.	1,080		**Conc.**	3,700					**Conc.**	8,600	
EMPC	1,130		**EMPC**	3,700					**EMPC**	8,650	

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Totals	Conc.	EMPC
Mono-Tri	4,890	4,940
Tetra-Hexa	52,800	52,900
Hepta-Deca	28,200	28,200
Mono-Deca	85,800	86,100

Sample ID: AC95422-006 — Method 1668A

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(1.23)		PCB-108/119/86/97/125/87	1,870	C	PCB-155	7.04		PCB-165	(2.51)	
PCB-96	13.1		PCB-117	95.8		PCB-152	(1.81)		PCB-146	885	
PCB-103	(7.62)		PCB-116/85	528	C	PCB-150	[6.18]	EMPC	PCB-161	(2.26)	
PCB-94	(8.89)		PCB-110	4,200		PCB-136	463		PCB-153/168	4,720	C
PCB-95	2,380		PCB-115	(5.91)		PCB-145	(1.92)		PCB-141	904	
PCB-100/93	35.4	C	PCB-82	377		PCB-148	[8.95]	EMPC	PCB-130	330	
PCB-102	96.6		PCB-111	(5.69)		PCB-151/135	2,170	C	PCB-137	176	
PCB-98	(9.48)		PCB-120	(5.75)		PCB-154	64.8		PCB-164	349	
PCB-88	(9.57)		PCB-107/124	88.2	C	PCB-144	267		PCB-163/138/129	5,540	C
PCB-91	463		PCB-109	167		PCB-147/149	4,960	C	PCB-160	(2.33)	
PCB-84	659		PCB-123	55.4		PCB-134	295		PCB-158	386	
PCB-89	36.7		PCB-106	(6.03)		PCB-143	(3.06)		PCB-128/166	947	C
PCB-121	(5.96)		PCB-118	1,910		PCB-139/140	78.5	C	PCB-159	75.2	
PCB-92	641		PCB-122	36.7		PCB-131	54.5		PCB-162	[19.6]	EMPC
PCB-113/90/101	2,930	C	PCB-114	35.6		PCB-142	(3.31)		PCB-167	188	
PCB-83	196		PCB-105	837		PCB-132	1,570		PCB-156/157	345	C
PCB-99	1,640		PCB-127	(5.61)		PCB-133	89.5		PCB-169	(12)	
PCB-112	(6.3)		PCB-126	21.7							
			Conc.	19,300					**Conc.**	24,900	
			EMPC	19,300					**EMPC**	24,900	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	6.28		PCB-174	2,800		PCB-202	457		PCB-208	281	
PCB-179	1,040		PCB-177	1,610		PCB-201	232		PCB-207	89.9	
PCB-184	3.42		PCB-181	(8.07)		PCB-204	(4.7)		PCB-206	812	
PCB-176	220		PCB-171/173	616	C	PCB-197	46				
PCB-186	(1.79)		PCB-172	347		PCB-200	195		**Conc.**	1,180	
PCB-178	460		PCB-192	(7)		PCB-198/199	1,760	C	**EMPC**	1,180	
PCB-175	[89.3]	EMPC	PCB-180/193	4,570	C	PCB-196	668				
PCB-187	4,020		PCB-191	72		PCB-203	1,000		**Deca**	**Conc.**	**Qualifiers**
PCB-182	11		PCB-170	1,740		PCB-195	639		PCB-209	629	
PCB-183	1,650		PCB-190	355		PCB-194	1,530				
PCB-185	165		PCB-189	63.5		PCB-205	73.5				
			Conc.	19,700		**Conc.**	6,590				
			EMPC	19,800		**EMPC**	6,590				

Sample ID: AC95422-007

Method 1668A

Client Data		Sample Data		Laboratory Data			
Name:	Hampton-Clarke, Inc.	Matrix:	Solid	Project No.:	A9587	Date Received:	04-Jan-2017
Project ID:	6123013	Weight/Volume:	5.72 g	Sample ID:	A9587_14621_PCB_007-D2	Date Extracted:	10-Jan-2017
Date Collected:	30-Dec-2016	% Solid	38.8 %	QC Batch No.:	14621	Date Analyzed:	24-Jan-2017

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/g	pg/g	pg/g			%
PCB-77 33'44'-TeCB	521				ES PCB-1	68.2
PCB-81 344'5-TeCB	12.3				ES PCB-3	71.9
PCB-105 233'44'-PeCB	1,310				ES PCB-4	87.1
PCB-114 2344'5-PeCB	54.3				ES PCB-15	94.5
PCB-118 23'44'5-PeCB	3,200				ES PCB-19	89.9
PCB-123 23'44'5'-PeCB	64.8				ES PCB-37	79.2
PCB-126 33'44'5-PeCB	23.1				ES PCB-54	83.1
PCB-156/157 233'44'5/233'44'5'-HxCB	377			C	ES PCB-77	77.7
PCB-167 23'44'55'-HxCB	158				ES PCB-81	83.6
PCB-169 33'44'55'-HxCB	ND	8.76			ES PCB-104	101
PCB-189 233'44'55'-HpCB	37.9				ES PCB-105	95.1
					ES PCB-114	89.5
TEQs (WHO 2005 M/H)					ES PCB-118	92.1
					ES PCB-123	95.4
ND = 0	2.52		2.52		ES PCB-126	85.4
ND = 0.5 x DL	2.65		2.65		ES PCB-153	94.8
ND = DL	2.78		2.78		ES PCB-155	95.7
					ES PCB-156/157	81.1
Totals					ES PCB-167	87.4
Mono-CB	362				ES PCB-169	71.5
Di-CB	3,230		3,240		ES PCB-170	107
Tri-CB	10,600		10,600		ES PCB-180	112
Tetra-CB	21,300		21,300		ES PCB-188	83.8
Penta-CB	24,000		24,000		ES PCB-189	94.7
Hexa-CB	18,600		18,700		ES PCB-202	89.3
Hepta-CB	8,780		8,790		ES PCB-205	89.3
Octa-CB	3,130		3,160		ES PCB-206	110
Nona-CB	967				ES PCB-208	106
Deca-CB	731				ES PCB-209	108
					CS PCB-28	81.1
Total PCB (Mono-Deca)	91,600		91,800		CS PCB-111	94.9
					CS PCB-178	81.7

Sample ID: AC95422-007

Method 1668A

Client Data		Sample Data		Laboratory Data			
Name:	Hampton-Clarke, Inc.	Matrix:	Solid	Project No.:	A9587	Date Received:	04-Jan-2017
Project ID:	6123013	Weight/Volume:	5.72 g	Sample ID:	A9587_14621_PCB_007-D2	Date Extracted:	10-Jan-2017
Date Collected:	30-Dec-2016	% Solid	38.8 %	QC Batch No.:	14621	Date Analyzed:	24-Jan-2017
		Units	pg/g	Checkcode:	690-754-PZL/A	Time Analyzed:	23:32:44

Mono	Conc.	Qualifiers
PCB-1	194	
PCB-2	81.2	
PCB-3	87.2	
Conc.	362	
EMPC	362	

Di	Conc.	Qualifiers
PCB-4	338	
PCB-10	45	
PCB-9	[17]	EMPC
PCB-7	13.2	
PCB-6	183	
PCB-5	4.23	
PCB-8	551	
PCB-14	(3.13)	
PCB-11	561	
PCB-13/12	205	C
PCB-15	1,330	
Conc.	3,230	
EMPC	3,240	

Tri	Conc.	Qualifiers
PCB-19	91.7	
PCB-30/18	670	C
PCB-17	510	
PCB-27	144	
PCB-24	10.1	
PCB-16	263	
PCB-32	366	
PCB-34	15.6	
PCB-23	(5.93)	
PCB-26/29	561	C
PCB-25	367	
PCB-31	2,010	
PCB-28/20	3,340	C
PCB-21/33	450	C
PCB-22	561	
PCB-36	[10.6]	EMPC
PCB-39	(5.39)	
PCB-38	(5.95)	
PCB-35	99.6	
PCB-37	1,100	
Conc.	10,600	
EMPC	10,600	

Tetra	Conc.	Qualifiers
PCB-54	[4.23]	EMPC
PCB-50/53	277	C
PCB-45	224	
PCB-51	85.7	
PCB-46	102	
PCB-52	2,820	
PCB-73	9.46	
PCB-43	73.5	
PCB-69/49	1,800	C
PCB-48	314	
PCB-44/47/65	2,550	C
PCB-59/62/75	231	C
PCB-42	806	
PCB-41	83	
PCB-71/40	1,170	C
PCB-64	898	

Tetra	Conc.	Qualifiers
PCB-72	56.4	
PCB-68	41	
PCB-57	16.5	
PCB-58	13.6	
PCB-67	80.4	
PCB-63	109	
PCB-61/70/74/76	3,940	C
PCB-66	3,400	
PCB-55	[22]	EMPC
PCB-56	1,180	
PCB-60	383	
PCB-80	17.6	
PCB-79	37.1	
PCB-78	(4.29)	
PCB-81	12.3	
PCB-77	521	
Conc.	21,300	
EMPC	21,300	

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Totals	Conc.	EMPC
Mono-Tri	14,100	14,200
Tetra-Hexa	63,900	63,900
Hepta-Deca	13,600	13,700
Mono-Deca	91,600	91,800

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Sample ID: AC95422-007 — Method 1668A

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(1.25)		PCB-108/119/86/97/125/87	2,200	C	PCB-155	[5.99]	EMPC	PCB-165	(1.4)	
PCB-96	22.2		PCB-117	136		PCB-152	4.21		PCB-146	784	
PCB-103	50.9		PCB-116/85	578	C	PCB-150	11.3		PCB-161	(1.29)	
PCB-94	[23.7]	EMPC	PCB-110	4,750		PCB-136	395		PCB-153/168	3,820	C
PCB-95	2,310		PCB-115	(5.34)		PCB-145	(1.06)		PCB-141	462	
PCB-100/93	51.9	C	PCB-82	439		PCB-148	[11.7]	EMPC	PCB-130	270	
PCB-102	129		PCB-111	(5.34)		PCB-151/135	1,340	C	PCB-137	127	
PCB-98	9.79		PCB-120	(5.35)		PCB-154	96.7		PCB-164	247	
PCB-88	(10.1)		PCB-107/124	117	C	PCB-144	113		PCB-163/138/129	4,400	C
PCB-91	441		PCB-109	287		PCB-147/149	3,330	C	PCB-160	(1.39)	
PCB-84	815		PCB-123	64.8		PCB-134	222		PCB-158	292	
PCB-89	38.5		PCB-106	(5.98)		PCB-143	[16.4]	EMPC	PCB-128/166	731	C
PCB-121	(5.56)		PCB-118	3,200		PCB-139/140	67.5	C	PCB-159	31.7	
PCB-92	703		PCB-122	44.8		PCB-131	35.5		PCB-162	21.1	
PCB-113/90/101	3,470	C	PCB-114	54.3		PCB-142	(1.89)		PCB-167	158	
PCB-83	270		PCB-105	1,310		PCB-132	1,200		PCB-156/157	377	C
PCB-99	2,470		PCB-127	(5.5)		PCB-133	87.7		PCB-169	(8.76)	
PCB-112	(5.58)		PCB-126	23.1							
			Conc.	24,000					**Conc.**	18,600	
			EMPC	24,000					**EMPC**	18,700	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	8.87		PCB-174	893		PCB-202	306		PCB-208	298	
PCB-179	516		PCB-177	791		PCB-201	118		PCB-207	56.3	
PCB-184	(1.19)		PCB-181	(3.29)		PCB-204	(1.36)		PCB-206	613	
PCB-176	110		PCB-171/173	281	C	PCB-197	29.8				
PCB-186	(1.13)		PCB-172	157		PCB-200	68.6		**Conc.**	967	
PCB-178	309		PCB-192	(2.92)		PCB-198/199	855	C	**EMPC**	967	
PCB-175	43.3		PCB-180/193	2,100	C	PCB-196	309				
PCB-187	1,860		PCB-191	29.7		PCB-203	461		**Deca**	**Conc.**	**Qualifiers**
PCB-182	[7.42]	EMPC	PCB-170	895		PCB-195	253		PCB-209	731	
PCB-183	547		PCB-190	141		PCB-194	732				
PCB-185	63.3		PCB-189	37.9		PCB-205	[30.8]	EMPC			
			Conc.	8,780		**Conc.**	3,130				
			EMPC	8,790		**EMPC**	3,160				

Sample ID: AC95422-008

Method 1668A

Client Data		Sample Data		Laboratory Data			
Name:	Hampton-Clarke, Inc.	Matrix:	Solid	Project No.:	A9587	Date Received:	04-Jan-2017
Project ID:	6123013	Weight/Volume:	5.53 g	Sample ID:	A9587_14621_PCB_008-D2	Date Extracted:	10-Jan-2017
Date Collected:	30-Dec-2016	% Solid	33.9 %	QC Batch No.:	14621	Date Analyzed:	25-Jan-2017

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/g	pg/g	pg/g			%
PCB-77 33'44'-TeCB	326				ES PCB-1	61
PCB-81 344'5-TeCB	7.48				ES PCB-3	67.8
PCB-105 233'44'-PeCB	1,150				ES PCB-4	80.6
PCB-114 2344'5-PeCB	43.6				ES PCB-15	89.6
PCB-118 23'44'5-PeCB	2,700				ES PCB-19	87.7
PCB-123 23'44'5'-PeCB	56.9				ES PCB-37	78.8
PCB-126 33'44'5-PeCB	EMPC		15		ES PCB-54	85
PCB-156/157 233'44'5/233'44'5'-HxCB	297			C	ES PCB-77	88
PCB-167 23'44'55'-HxCB	131				ES PCB-81	95.1
PCB-169 33'44'55'-HxCB	ND	5.61			ES PCB-104	90.9
PCB-189 233'44'55'-HpCB	32.4				ES PCB-105	83.4
					ES PCB-114	88
TEQs (WHO 2005 M/H)					ES PCB-118	85.7
					ES PCB-123	83.2
ND = 0	0.167		1.67		ES PCB-126	79.2
ND = 0.5 x DL	0.421		1.75		ES PCB-153	93.9
ND = DL	0.675		1.84		ES PCB-155	96.7
					ES PCB-156/157	84.5
Totals					ES PCB-167	92.9
Mono-CB	292				ES PCB-169	69.7
Di-CB	2,520				ES PCB-170	113
Tri-CB	8,220		8,220		ES PCB-180	114
Tetra-CB	15,400				ES PCB-188	79.8
Penta-CB	21,200		21,300		ES PCB-189	99.7
Hexa-CB	15,900				ES PCB-202	89.1
Hepta-CB	7,350		7,360		ES PCB-205	83.3
Octa-CB	2,600				ES PCB-206	124
Nona-CB	685				ES PCB-208	118
Deca-CB	522				ES PCB-209	115
					CS PCB-28	83.1
Total PCB (Mono-Deca)	74,600		74,700		CS PCB-111	96.6
					CS PCB-178	85.7

Sample ID: AC95422-008 — Method 1668A

Client Data		Sample Data		Laboratory Data			
Name:	Hampton-Clarke, Inc.	Matrix:	Solid	Project No.:	A9587	Date Received:	04-Jan-2017
Project ID:	6123013	Weight/Volume:	5.53 g	Sample ID:	A9587_14621_PCB_008-D2	Date Extracted:	10-Jan-2017
Date Collected:	30-Dec-2016	% Solid	33.9 %	QC Batch No.:	14621	Date Analyzed:	25-Jan-2017
		Units	pg/g	Checkcode:	664-559-STZ/A	Time Analyzed:	00:28:19

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	152		PCB-19	75.1		PCB-54	3.92		PCB-72	35.6	
PCB-2	66.7		PCB-30/18	529	C	PCB-50/53	204	C	PCB-68	27.1	
PCB-3	74		PCB-17	396		PCB-45	158		PCB-57	11	
			PCB-27	115		PCB-51	58.1		PCB-58	13.9	
Conc.	292		PCB-24	[7.44]	EMPC	PCB-46	74		PCB-67	60.4	
EMPC	292		PCB-16	203		PCB-52	2,060		PCB-63	80.3	
			PCB-32	279		PCB-73	7.05		PCB-61/70/74/76	2,830	C
Di	**Conc.**	**Qualifiers**	PCB-34	12.8		PCB-43	52.3		PCB-66	2,440	
PCB-4	292		PCB-23	(7.56)		PCB-69/49	1,270	C	PCB-55	19	
PCB-10	39.3		PCB-26/29	426	C	PCB-48	221		PCB-56	876	
PCB-9	16		PCB-25	286		PCB-44/47/65	1,850	C	PCB-60	289	
PCB-7	11.5		PCB-31	1,560		PCB-59/62/75	170	C	PCB-80	13.1	
PCB-6	148		PCB-28/20	2,670	C	PCB-42	591		PCB-79	24.8	
PCB-5	(3.22)		PCB-21/33	368	C	PCB-41	44.7		PCB-78	(4.35)	
PCB-8	433		PCB-22	456		PCB-71/40	889	C	PCB-81	7.48	
PCB-14	(2.68)		PCB-36	(7.11)		PCB-64	688		PCB-77	326	
PCB-11	404		PCB-39	12.3							
PCB-13/12	160	C	PCB-38	(7.59)							
PCB-15	1,020		PCB-35	(7.86)							
			PCB-37	827							
Conc.	2,520		**Conc.**	8,220					**Conc.**	15,400	
EMPC	2,520		**EMPC**	8,220					**EMPC**	15,400	

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Totals	Conc.	EMPC
Mono-Tri	11,000	11,000
Tetra-Hexa	52,500	52,500
Hepta-Deca	11,200	11,200
Mono-Deca	74,600	74,700

Sample ID: AC95422-008 — Method 1668A

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(0.861)		PCB-108/119/86/97/125/87	1,980	C	PCB-155	5.41		PCB-165	(1.56)	
PCB-96	[13.4]	EMPC	PCB-117	92.5		PCB-152	(0.929)		PCB-146	659	
PCB-103	41.5		PCB-116/85	560	C	PCB-150	7.68		PCB-161	(1.43)	
PCB-94	[24.3]	EMPC	PCB-110	4,330		PCB-136	310		PCB-153/168	3,210	C
PCB-95	2,050		PCB-115	(5.88)		PCB-145	(0.97)		PCB-141	376	
PCB-100/93	45	C	PCB-82	401		PCB-148	11.6		PCB-130	244	
PCB-102	125		PCB-111	(5.88)		PCB-151/135	1,130	C	PCB-137	112	
PCB-98	(8.7)		PCB-120	18.6		PCB-154	74.7		PCB-164	211	
PCB-88	(11.1)		PCB-107/124	91.2	C	PCB-144	101		PCB-163/138/129	3,790	C
PCB-91	376		PCB-109	254		PCB-147/149	2,880	C	PCB-160	(1.55)	
PCB-84	731		PCB-123	56.9		PCB-134	182		PCB-158	251	
PCB-89	37.3		PCB-106	(6.59)		PCB-143	30.5		PCB-128/166	601	C
PCB-121	(6.13)		PCB-118	2,700		PCB-139/140	54.3	C	PCB-159	21.1	
PCB-92	641		PCB-122	33.5		PCB-131	30.1		PCB-162	14.1	
PCB-113/90/101	3,090	C	PCB-114	43.6		PCB-142	(2.09)		PCB-167	131	
PCB-83	206		PCB-105	1,150		PCB-132	1,040		PCB-156/157	297	C
PCB-99	2,170		PCB-127	(7.29)		PCB-133	77.2		PCB-169	(5.61)	
PCB-112	(6.15)		PCB-126	[15]	EMPC						
			Conc.	21,200					**Conc.**	15,900	
			EMPC	21,300					**EMPC**	15,900	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	9.21		PCB-174	794		PCB-202	242		PCB-208	201	
PCB-179	432		PCB-177	652		PCB-201	90.1		PCB-207	39.9	
PCB-184	(1.25)		PCB-181	(4.36)		PCB-204	(1.85)		PCB-206	443	
PCB-176	92.8		PCB-171/173	246	C	PCB-197	22.2				
PCB-186	(1.19)		PCB-172	130		PCB-200	63.5		**Conc.**	685	
PCB-178	256		PCB-192	(3.86)		PCB-198/199	669	C	**EMPC**	685	
PCB-175	32.3		PCB-180/193	1,750	C	PCB-196	250				
PCB-187	1,560		PCB-191	29		PCB-203	389		**Deca**	**Conc.**	**Qualifiers**
PCB-182	[6.68]	EMPC	PCB-170	716		PCB-195	224		PCB-209	522	
PCB-183	454		PCB-190	115		PCB-194	631				
PCB-185	57.5		PCB-189	32.4		PCB-205	21.7				
			Conc.	7,350		**Conc.**	2,600				
			EMPC	7,360		**EMPC**	2,600				

Sample ID: AC95422-009

Method 1668A

Client Data		Sample Data		Laboratory Data			
Name:	Hampton-Clarke, Inc.	Matrix:	Solid	Project No.:	A9587	Date Received:	04-Jan-2017
Project ID:	6123013	Weight/Volume:	3.89 g	Sample ID:	A9587_14621_PCB_009-D2	Date Extracted:	10-Jan-2017
Date Collected:	30-Dec-2016	% Solid	15.4 %	QC Batch No.:	14621	Date Analyzed:	25-Jan-2017

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/g	pg/g	pg/g			%
PCB-77 33'44'-TeCB	28.8				ES PCB-1	56.7
PCB-81 344'5-TeCB	ND	4.95			ES PCB-3	60.8
PCB-105 233'44'-PeCB	109				ES PCB-4	73.3
PCB-114 2344'5-PeCB	ND	3.39			ES PCB-15	85.3
PCB-118 23'44'5-PeCB	214				ES PCB-19	86.5
PCB-123 23'44'5'-PeCB	7.31				ES PCB-37	77.9
PCB-126 33'44'5-PeCB	ND	3.02			ES PCB-54	74.3
PCB-156/157 233'44'5/233'44'5'-HxCB	21.1			C	ES PCB-77	92
PCB-167 23'44'55'-HxCB	11.7				ES PCB-81	94
PCB-169 33'44'55'-HxCB	ND	3.21			ES PCB-104	87.3
PCB-189 233'44'55'-HpCB	ND	2.64			ES PCB-105	87
					ES PCB-114	92.5
TEQs (WHO 2005 M/H)					ES PCB-118	89.7
					ES PCB-123	95.1
ND = 0	0.0138		0.0138		ES PCB-126	104
ND = 0.5 x DL	0.214		0.214		ES PCB-153	96.4
ND = DL	0.413		0.413		ES PCB-155	85.7
					ES PCB-156/157	89.6
Totals					ES PCB-167	90.7
Mono-CB	31.4		57.3		ES PCB-169	89
Di-CB	382				ES PCB-170	117
Tri-CB	773		826		ES PCB-180	112
Tetra-CB	1,210		1,230		ES PCB-188	80.6
Penta-CB	1,410		1,480		ES PCB-189	104
Hexa-CB	975		1,060		ES PCB-202	98.3
Hepta-CB	440		481		ES PCB-205	87.7
Octa-CB	141		199		ES PCB-206	115
Nona-CB	99.3				ES PCB-208	114
Deca-CB	30.6				ES PCB-209	121
					CS PCB-28	73.6
Total PCB (Mono-Deca)	5,490		5,840		CS PCB-111	95.7
					CS PCB-178	79.7

Checkcode: 108-330-YVP/A SGS North America - PCB v0.66 Report Created: 25-Jan-2017 15:17 Analyst: LB

Sample ID: AC95422-009

Method 1668A

Client Data		Sample Data		Laboratory Data			
Name:	Hampton-Clarke, Inc.	Matrix:	Solid	Project No.:	A9587	Date Received:	04-Jan-2017
Project ID:	6123013	Weight/Volume:	3.89 g	Sample ID:	A9587_14621_PCB_009-D2	Date Extracted:	10-Jan-2017
Date Collected:	30-Dec-2016	% Solid	15.4 %	QC Batch No.:	14621	Date Analyzed:	25-Jan-2017
		Units	pg/g	Checkcode:	108-330-YVP/A	Time Analyzed:	01:23:47

Mono	Conc.	Qualifiers	Tri	Conc.	Qualifiers	Tetra	Conc.	Qualifiers	Tetra	Conc.	Qualifiers
PCB-1	31.4		PCB-19	(15.7)		PCB-54	(2.32)		PCB-72	(4.54)	
PCB-2	[13.4]	EMPC	PCB-30/18	64.6	C	PCB-50/53	15.4	C	PCB-68	(4.15)	
PCB-3	[12.6]	EMPC	PCB-17	[41.5]	EMPC	PCB-45	11.9		PCB-57	(4.67)	
			PCB-27	[11.6]	EMPC	PCB-51	[5.79]	EMPC	PCB-58	(4.53)	
Conc.	31.4		PCB-24	(11.1)		PCB-46	(4.5)		PCB-67	(4.37)	
EMPC	57.3		PCB-16	27.1		PCB-52	164		PCB-63	(4.13)	
			PCB-32	32.4		PCB-73	(2.82)		PCB-61/70/74/76	243	C
Di	**Conc.**	**Qualifiers**	PCB-34	(9.7)		PCB-43	(4.58)		PCB-66	202	
PCB-4	50.4		PCB-23	(9.59)		PCB-69/49	97.1	C	PCB-55	(4.67)	
PCB-10	(6.45)		PCB-26/29	40.6	C	PCB-48	17.2		PCB-56	70	
PCB-9	(4.94)		PCB-25	26.6		PCB-44/47/65	154	C	PCB-60	30.1	
PCB-7	(4.63)		PCB-31	149		PCB-59/62/75	[12.9]	EMPC C	PCB-80	(4.09)	
PCB-6	23		PCB-28/20	258	C	PCB-42	48.3		PCB-79	(4.03)	
PCB-5	(4.95)		PCB-21/33	38.9	C	PCB-41	(4.46)		PCB-78	(4.73)	
PCB-8	73.4		PCB-22	46.9		PCB-71/40	72.5	C	PCB-81	(4.95)	
PCB-14	(4.11)		PCB-36	(9.01)		PCB-64	57.7		PCB-77	28.8	
PCB-11	61.7	B	PCB-39	(8.71)							
PCB-13/12	24.6	C	PCB-38	(9.62)							
PCB-15	149		PCB-35	(9.97)							
			PCB-37	88.4							
Conc.	382		**Conc.**	773					**Conc.**	1,210	
EMPC	382		**EMPC**	826					**EMPC**	1,230	

Totals	Conc.	EMPC
Mono-Tri	1,190	1,270
Tetra-Hexa	3,590	3,770
Hepta-Deca	711	810
Mono-Deca	5,490	5,840

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Sample ID: AC95422-009 — Method 1668A

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(1.18)		PCB-108/119/86/97/125/87	145	C	PCB-155	(1.26)		PCB-165	(1.68)	
PCB-96	(1.29)		PCB-117	[5.23]	EMPC	PCB-152	(1.27)		PCB-146	41.3	
PCB-103	(4.1)		PCB-116/85	41.1	C	PCB-150	(1.28)		PCB-161	(1.54)	
PCB-94	(4.7)		PCB-110	290		PCB-136	24.9		PCB-153/168	227	C
PCB-95	138		PCB-115	(2.99)		PCB-145	(1.32)		PCB-141	26.9	
PCB-100/93	(4.26)	C	PCB-82	26.7		PCB-148	(1.99)		PCB-130	15.2	
PCB-102	10.3		PCB-111	(2.99)		PCB-151/135	70.9	C	PCB-137	(2.02)	
PCB-98	(4.42)		PCB-120	(3)		PCB-154	[5.36]	EMPC	PCB-164	20.7	
PCB-88	(5.67)		PCB-107/124	[7.49]	EMPC C	PCB-144	[5.24]	EMPC	PCB-163/138/129	269	C
PCB-91	23.9		PCB-109	20.6		PCB-147/149	172	C	PCB-160	(1.67)	
PCB-84	[45.7]	EMPC	PCB-123	7.31		PCB-134	[9.81]	EMPC	PCB-158	[16.7]	EMPC
PCB-89	(4.78)		PCB-106	(3.35)		PCB-143	7.15		PCB-128/166	[42.7]	EMPC C
PCB-121	(3.11)		PCB-118	214		PCB-139/140	[5.32]	EMPC C	PCB-159	(2.73)	
PCB-92	41.6		PCB-122	(3.59)		PCB-131	(2.31)		PCB-162	(2.75)	
PCB-113/90/101	197	C	PCB-114	(3.39)		PCB-142	(2.26)		PCB-167	11.7	
PCB-83	[12.6]	EMPC	PCB-105	109		PCB-132	67		PCB-156/157	21.1	C
PCB-99	142		PCB-127	(3.42)		PCB-133	(2.11)		PCB-169	(3.21)	
PCB-112	(3.12)		PCB-126	(3.02)							
			Conc.	1,410					**Conc.**	975	
			EMPC	1,480					**EMPC**	1,060	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(1.65)		PCB-174	60.2		PCB-202	[16.3]	EMPC	PCB-208	25.7	
PCB-179	31.2		PCB-177	42.8		PCB-201	5.1		PCB-207	(5.82)	
PCB-184	(1.64)		PCB-181	(2.26)		PCB-204	(1.95)		PCB-206	73.6	
PCB-176	(1.48)		PCB-171/173	[15.1]	EMPC C	PCB-197	(1.75)				
PCB-186	(1.56)		PCB-172	[8.27]	EMPC	PCB-200	(2.02)		**Conc.**	99.3	
PCB-178	[17.4]	EMPC	PCB-192	(2)		PCB-198/199	61.8	C	**EMPC**	99.3	
PCB-175	(2.33)		PCB-180/193	115	C	PCB-196	20.1				
PCB-187	95.1		PCB-191	(1.92)		PCB-203	37.7		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(2.13)		PCB-170	51		PCB-195	16.1		PCB-209	30.6	
PCB-183	36.4		PCB-190	8.45		PCB-194	[42.3]	EMPC			
PCB-185	(2.37)		PCB-189	(2.64)		PCB-205	(8.11)				
			Conc.	440		**Conc.**	141				
			EMPC	481		**EMPC**	199				

Sample ID: AC95422-010

Method 1668A

Client Data		Sample Data		Laboratory Data			
Name:	Hampton-Clarke, Inc.	Matrix:	Solid	Project No.:	A9587	Date Received:	04-Jan-2017
Project ID:	6123013	Weight/Volume:	4.93 g	Sample ID:	A9587_14621_PCB_010-D2	Date Extracted:	10-Jan-2017
Date Collected:	30-Dec-2016	% Solid	21.2 %	QC Batch No.:	14621	Date Analyzed:	25-Jan-2017

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/g	pg/g	pg/g			%
PCB-77 33'44'-TeCB	225				ES PCB-1	61.3
PCB-81 344'5-TeCB	9.37				ES PCB-3	65.6
PCB-105 233'44'-PeCB	996				ES PCB-4	80.6
PCB-114 2344'5-PeCB	35.3				ES PCB-15	90.4
PCB-118 23'44'5-PeCB	2,000				ES PCB-19	89.5
PCB-123 23'44'5'-PeCB	55.8				ES PCB-37	81
PCB-126 33'44'5-PeCB	21.3				ES PCB-54	82.4
PCB-156/157 233'44'5/233'44'5'-HxCB	273			C	ES PCB-77	90.5
PCB-167 23'44'55'-HxCB	120				ES PCB-81	95.6
PCB-169 33'44'55'-HxCB	ND	3.58			ES PCB-104	85.8
PCB-189 233'44'55'-HpCB	27.5				ES PCB-105	87.7
					ES PCB-114	90.1
TEQs (WHO 2005 M/H)					ES PCB-118	88.4
					ES PCB-123	80.8
ND = 0	2.26		2.26		ES PCB-126	84
ND = 0.5 x DL	2.32		2.32		ES PCB-153	100
ND = DL	2.37		2.37		ES PCB-155	92.7
					ES PCB-156/157	96.9
Totals					ES PCB-167	91.7
Mono-CB	71.4				ES PCB-169	80
Di-CB	694				ES PCB-170	105
Tri-CB	2,500		2,520		ES PCB-180	101
Tetra-CB	7,650		7,670		ES PCB-188	85.9
Penta-CB	15,900		16,000		ES PCB-189	101
Hexa-CB	12,400		12,400		ES PCB-202	93.9
Hepta-CB	5,840		5,840		ES PCB-205	99.9
Octa-CB	1,920				ES PCB-206	116
Nona-CB	515				ES PCB-208	111
Deca-CB	345				ES PCB-209	109
					CS PCB-28	79.2
Total PCB (Mono-Deca)	47,900		48,000		CS PCB-111	87.1
					CS PCB-178	86.5

Checkcode: 630-786-PXK/A SGS North America - PCB v0.66 Report Created: 25-Jan-2017 15:17 Analyst: LB

Sample ID: AC95422-010

Method 1668A

Client Data		Sample Data		Laboratory Data			
Name:	Hampton-Clarke, Inc.	Matrix:	Solid	Project No.:	A9587	Date Received:	04-Jan-2017
Project ID:	6123013	Weight/Volume:	4.93 g	Sample ID:	A9587_14621_PCB_010-D2	Date Extracted:	10-Jan-2017
Date Collected:	30-Dec-2016	% Solid	21.2 %	QC Batch No.:	14621	Date Analyzed:	25-Jan-2017
		Units	pg/g	Checkcode:	630-786-PXK/A	Time Analyzed:	02:19:22

Mono	Conc.	Qualifiers
PCB-1	28	
PCB-2	20.3	
PCB-3	23.1	
Conc.	71.4	
EMPC	71.4	
Di	**Conc.**	**Qualifiers**
PCB-4	55.6	
PCB-10	5.14	
PCB-9	5.3	
PCB-7	(4.23)	
PCB-6	33.4	
PCB-5	(4.52)	
PCB-8	102	
PCB-14	(3.76)	
PCB-11	146	
PCB-13/12	41.8	C
PCB-15	304	
Conc.	694	
EMPC	694	

Tri	Conc.	Qualifiers
PCB-19	21.9	
PCB-30/18	157	C
PCB-17	94.9	
PCB-27	28.6	
PCB-24	(7.17)	
PCB-16	60.6	
PCB-32	78.2	
PCB-34	(9.5)	
PCB-23	(9.39)	
PCB-26/29	101	C
PCB-25	78.2	
PCB-31	454	
PCB-28/20	832	C
PCB-21/33	103	C
PCB-22	141	
PCB-36	(8.83)	
PCB-39	(8.53)	
PCB-38	(9.42)	
PCB-35	[25]	EMPC
PCB-37	348	
Conc.	2,500	
EMPC	2,520	

Tetra	Conc.	Qualifiers
PCB-54	(1.58)	
PCB-50/53	90.5	C
PCB-45	87.2	
PCB-51	14	
PCB-46	30.6	
PCB-52	1,000	
PCB-73	2.58	
PCB-43	25.6	
PCB-69/49	549	C
PCB-48	81.2	
PCB-44/47/65	831	C
PCB-59/62/75	86.2	C
PCB-42	260	
PCB-41	24.1	
PCB-71/40	412	C
PCB-64	352	
Conc.		
EMPC		

Tetra	Conc.	Qualifiers
PCB-72	14.6	
PCB-68	[9.12]	EMPC
PCB-57	(3.67)	
PCB-58	(3.56)	
PCB-67	27.5	
PCB-63	37.6	
PCB-61/70/74/76	1,410	C
PCB-66	1,380	
PCB-55	[8.01]	EMPC
PCB-56	478	
PCB-60	196	
PCB-80	(3.21)	
PCB-79	20.7	
PCB-78	(3.72)	
PCB-81	9.37	
PCB-77	225	
Conc.	7,650	
EMPC	7,670	

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Totals	Conc.	EMPC
Mono-Tri	3,260	3,290
Tetra-Hexa	36,000	36,100
Hepta-Deca	8,620	8,620
Mono-Deca	47,900	48,000

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Sample ID: AC95422-010 — Method 1668A

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(0.953)		PCB-108/119/86/97/125/87	1,630	C	PCB-155	[4.04]	EMPC	PCB-165	(1.85)	
PCB-96	[11.3]	EMPC	PCB-117	58.8		PCB-152	(1.48)		PCB-146	438	
PCB-103	20.1		PCB-116/85	523	C	PCB-150	(1.5)		PCB-161	(1.7)	
PCB-94	30.7		PCB-110	3,270		PCB-136	248		PCB-153/168	2,440	C
PCB-95	1,440		PCB-115	(3.92)		PCB-145	(1.55)		PCB-141	388	
PCB-100/93	[22.8]	EMPC C	PCB-82	314		PCB-148	(2.2)		PCB-130	186	
PCB-102	144		PCB-111	(3.91)		PCB-151/135	783	C	PCB-137	115	
PCB-98	(5.8)		PCB-120	(3.93)		PCB-154	34.4		PCB-164	165	
PCB-88	(7.42)		PCB-107/124	87.1	C	PCB-144	68		PCB-163/138/129	3,210	C
PCB-91	255		PCB-109	199		PCB-147/149	2,010	C	PCB-160	(1.84)	
PCB-84	517		PCB-123	55.8		PCB-134	129		PCB-158	205	
PCB-89	58.9		PCB-106	(4.39)		PCB-143	80.7		PCB-128/166	550	C
PCB-121	(4.08)		PCB-118	2,000		PCB-139/140	38.1	C	PCB-159	25	
PCB-92	436		PCB-122	29.3		PCB-131	[24.9]	EMPC	PCB-162	16.1	
PCB-113/90/101	2,090	C	PCB-114	35.3		PCB-142	(2.49)		PCB-167	120	
PCB-83	144		PCB-105	996		PCB-132	835		PCB-156/157	273	C
PCB-99	1,570		PCB-127	(4.1)		PCB-133	45.1		PCB-169	(3.58)	
PCB-112	(4.09)		PCB-126	21.3							
			Conc.	15,900					**Conc.**	12,400	
			EMPC	16,000					**EMPC**	12,400	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	[2.75]	EMPC	PCB-174	761		PCB-202	171		PCB-208	152	
PCB-179	297		PCB-177	489		PCB-201	62		PCB-207	27.5	
PCB-184	(1.44)		PCB-181	(2.97)		PCB-204	(2.09)		PCB-206	335	
PCB-176	69.2		PCB-171/173	193	C	PCB-197	15.3				
PCB-186	[3.16]	EMPC	PCB-172	115		PCB-200	64		**Conc.**	515	
PCB-178	178		PCB-192	(2.63)		PCB-198/199	525	C	**EMPC**	515	
PCB-175	22.4		PCB-180/193	1,480	C	PCB-196	196				
PCB-187	1,060		PCB-191	25.8		PCB-203	346		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(2.8)		PCB-170	613		PCB-195	150		PCB-209	345	
PCB-183	358		PCB-190	106		PCB-194	376				
PCB-185	44.4		PCB-189	27.5		PCB-205	19.8				
			Conc.	5,840		**Conc.**	1,920				
			EMPC	5,840		**EMPC**	1,920				

Sample ID: Method Blank A9587_14621

Method 1668A

Client Data		Sample Data		Laboratory Data			
Name:	Hampton-Clarke, Inc.	Matrix:	Solid	Project No.:	A9587	Date Received:	n/a
Project ID:	6123013	Weight/Volume:	5.00 g	Sample ID:	MB1_14621_PCB_SDS	Date Extracted:	10-Jan-2017
Date Collected:	n/a	% Solid	n/a	QC Batch No.:	14621	Date Analyzed:	24-Jan-2017

Analyte	Conc.	DL	EMPC	Qualifier	Standard	Recovery
	pg/g	pg/g	pg/g			%
PCB-77 33'44'-TeCB	ND	1.41			ES PCB-1	59.8
PCB-81 344'5-TeCB	ND	1.57			ES PCB-3	59.5
PCB-105 233'44'-PeCB	ND	1.12			ES PCB-4	66.7
PCB-114 2344'5-PeCB	ND	1.05			ES PCB-15	78.6
PCB-118 23'44'5-PeCB	3.45				ES PCB-19	73.2
PCB-123 23'44'5'-PeCB	ND	1.07			ES PCB-37	70.6
PCB-126 33'44'5-PeCB	ND	0.762			ES PCB-54	63.2
PCB-156/157 233'44'5/233'44'5'-HxCB	ND	1.08		C	ES PCB-77	94
PCB-167 23'44'55'-HxCB	ND	0.796			ES PCB-81	91.6
PCB-169 33'44'55'-HxCB	ND	0.869			ES PCB-104	62.5
PCB-189 233'44'55'-HpCB	ND	0.895			ES PCB-105	86.9
					ES PCB-114	84.3
TEQs (WHO 2005 M/H)					ES PCB-118	82.9
					ES PCB-123	81
ND = 0	0.000103		0.000103		ES PCB-126	94.6
ND = 0.5 x DL	0.0517		0.0517		ES PCB-153	83.6
ND = DL	0.103		0.103		ES PCB-155	69.8
					ES PCB-156/157	90.4
Totals					ES PCB-167	87.3
Mono-CB	ND	1.19			ES PCB-169	94.7
Di-CB	13.9				ES PCB-170	85.2
Tri-CB	ND	2.24			ES PCB-180	79.6
Tetra-CB	12.8		21.2		ES PCB-188	68.3
Penta-CB	20.3		38.5		ES PCB-189	89
Hexa-CB	7.19		17.4		ES PCB-202	84.3
Hepta-CB	ND	1.08			ES PCB-205	86.9
Octa-CB	ND	0.994			ES PCB-206	92.7
Nona-CB	ND	2.14			ES PCB-208	90
Deca-CB	ND	1.52			ES PCB-209	97
					CS PCB-28	69.6
Total PCB (Mono-Deca)	54.1		91		CS PCB-111	90.2
					CS PCB-178	75.6

Checkcode: 078-941-QHM/A SGS North America - PCB v0.66 Report Created: 25-Jan-2017 15:14 Analyst: LB

Sample ID: Method Blank A9587_14621

Method 1668A

Client Data		Sample Data		Laboratory Data			
Name:	Hampton-Clarke, Inc.	Matrix:	Solid	Project No.:	A9587	Date Received:	n/a
Project ID:	6123013	Weight/Volume:	5.00 g	Sample ID:	MB1_14621_PCB_SDS	Date Extracted:	10-Jan-2017
Date Collected:	n/a	% Solid	n/a	QC Batch No.:	14621	Date Analyzed:	24-Jan-2017
		Units	pg/g	Checkcode:	078-941-QHM/A	Time Analyzed:	15:01:34

Mono	Conc.	Qualifiers
PCB-1	(1.09)	
PCB-2	(1.13)	
PCB-3	(1.3)	
Conc.	0	
EMPC	0	

Di	Conc.	Qualifiers
PCB-4	(4.07)	
PCB-10	(2.72)	
PCB-9	(3.14)	
PCB-7	(2.85)	
PCB-6	(2.96)	
PCB-5	(3.05)	
PCB-8	(2.96)	
PCB-14	(2.63)	
PCB-11	13.9	
PCB-13/12	(3.04)	C
PCB-15	(3.02)	
Conc.	13.9	
EMPC	13.9	

Tri	Conc.	Qualifiers
PCB-19	(2.33)	
PCB-30/18	(1.9)	C
PCB-17	(2.21)	
PCB-27	(1.63)	
PCB-24	(1.72)	
PCB-16	(2.77)	
PCB-32	(1.51)	
PCB-34	(1.93)	
PCB-23	(1.95)	
PCB-26/29	(1.92)	C
PCB-25	(1.86)	
PCB-31	(1.73)	
PCB-28/20	(1.92)	C
PCB-21/33	(1.85)	C
PCB-22	(2.04)	
PCB-36	(1.82)	
PCB-39	(1.76)	
PCB-38	(1.94)	
PCB-35	(2)	
PCB-37	(2.16)	
Conc.	0	
EMPC	0	

Tetra	Conc.	Qualifiers
PCB-54	(0.963)	
PCB-50/53	(1.47)	C
PCB-45	(1.87)	
PCB-51	(1.39)	
PCB-46	(1.84)	
PCB-52	7.85	
PCB-73	(1.19)	
PCB-43	(1.82)	
PCB-69/49	[2.35]	J EMPC C
PCB-48	(1.54)	
PCB-44/47/65	[6.09]	EMPC C
PCB-59/62/75	(1.12)	C
PCB-42	(1.64)	
PCB-41	(1.75)	
PCB-71/40	(1.53)	C
PCB-64	(1.03)	
Conc.		
EMPC		

Tetra	Conc.	Qualifiers
PCB-72	(1.38)	
PCB-68	(1.31)	
PCB-57	(1.45)	
PCB-58	(1.44)	
PCB-67	(1.36)	
PCB-63	(1.32)	
PCB-61/70/74/76	4.91	J C
PCB-66	(1.5)	
PCB-55	(1.47)	
PCB-56	(1.52)	
PCB-60	(1.45)	
PCB-80	(1.28)	
PCB-79	(1.3)	
PCB-78	(1.52)	
PCB-81	(1.57)	
PCB-77	(1.41)	
Conc.	12.8	
EMPC	21.2	

5500 Business Drive
Wilmington, NC 28405, USA
Tel: +1 910 794-1613
www.us.sgs.com

Totals	Conc.	EMPC
Mono-Tri	13.9	13.9
Tetra-Hexa	40.2	77.1
Hepta-Deca	0	0
Mono-Deca	54.1	91

SGS

Sample ID: Method Blank A9587_14621 — Method 1668A

Penta	Conc.	Qualifiers	Penta	Conc.	Qualifiers	Hexa	Conc.	Qualifiers	Hexa	Conc.	Qualifiers
PCB-104	(0.789)		PCB-108/119/86/97/125/87	5.3	J C	PCB-155	(0.786)		PCB-165	(0.774)	
PCB-96	(0.838)		PCB-117	(1.1)		PCB-152	(0.794)		PCB-146	(0.851)	
PCB-103	(1.34)		PCB-116/85	(1.24)	C	PCB-150	(0.811)		PCB-161	(0.697)	
PCB-94	(1.56)		PCB-110	8.57		PCB-136	[1.82]	J EMPC	PCB-153/168	4.14	C
PCB-95	[7.38]	EMPC	PCB-115	(1.04)		PCB-145	(0.842)		PCB-141	(0.928)	
PCB-100/93	(1.44)	C	PCB-82	(1.7)		PCB-148	(0.902)		PCB-130	(1.04)	
PCB-102	(1.26)		PCB-111	(1)		PCB-151/135	3.04	J C	PCB-137	(0.857)	
PCB-98	(1.67)		PCB-120	(1.01)		PCB-154	(0.826)		PCB-164	(0.699)	
PCB-88	(1.68)		PCB-107/124	(1.09)	C	PCB-144	(0.918)		PCB-163/138/129	[3.69]	J EMPC C
PCB-91	(1.24)		PCB-109	(1)		PCB-147/149	[4.67]	EMPC C	PCB-160	(0.718)	
PCB-84	[3.8]	EMPC	PCB-123	(1.07)		PCB-134	(1.15)		PCB-158	(0.648)	
PCB-89	(1.62)		PCB-106	(1.06)		PCB-143	(0.942)		PCB-128/166	(0.991)	C
PCB-121	(1.05)		PCB-118	3.45		PCB-139/140	(0.891)	C	PCB-159	(0.847)	
PCB-92	(1.52)		PCB-122	(1.12)		PCB-131	(1.04)		PCB-162	(0.838)	
PCB-113/90/101	[7.09]	EMPC C	PCB-114	(1.05)		PCB-142	(1.02)		PCB-167	(0.796)	
PCB-83	(1.87)		PCB-105	(1.12)		PCB-132	(0.983)		PCB-156/157	(1.08)	C
PCB-99	2.95		PCB-127	(1.05)		PCB-133	(0.931)		PCB-169	(0.869)	
PCB-112	(1.11)		PCB-126	(0.762)							
			Conc.	20.3					**Conc.**	7.19	
			EMPC	38.5					**EMPC**	17.4	

Hepta	Conc.	Qualifiers	Hepta	Conc.	Qualifiers	Octa	Conc.	Qualifiers	Nona	Conc.	Qualifiers
PCB-188	(0.75)		PCB-174	(1.44)		PCB-202	(0.81)		PCB-208	(1.78)	
PCB-179	(0.734)		PCB-177	(1.43)		PCB-201	(0.815)		PCB-207	(1.77)	
PCB-184	(0.76)		PCB-181	(1.23)		PCB-204	(0.859)		PCB-206	(2.51)	
PCB-176	(0.672)		PCB-171/173	(1.42)	C	PCB-197	(0.822)				
PCB-186	(0.713)		PCB-172	(1.39)		PCB-200	(0.824)		**Conc.**	0	
PCB-178	(0.975)		PCB-192	(1.07)		PCB-198/199	(1.17)	C	**EMPC**	0	
PCB-175	(1.28)		PCB-180/193	(1.11)	C	PCB-196	(1.14)				
PCB-187	(1.23)		PCB-191	(1.01)		PCB-203	(1.1)		**Deca**	**Conc.**	**Qualifiers**
PCB-182	(1.2)		PCB-170	(1.26)		PCB-195	(1.56)		PCB-209	(1.52)	
PCB-183	(1.23)		PCB-190	(0.925)		PCB-194	(1.47)				
PCB-185	(1.23)		PCB-189	(0.895)		PCB-205	(1.18)				
			Conc.	0		**Conc.**	0				
			EMPC	0		**EMPC**	0				

METHOD 1668A **PCB ONGOING PRECISION AND RECOVERY (OPR)** **FORM 8A**

Lab Name: SGS North America
Initial Calibration: ICAL: MM4_PCB_04072016_13SEPT2016
Instrument ID: MM4 GC Column ID:
VER Data Filename: 170124S02 Analysis Date: 24-JAN-2017 13:12:21
Lab ID: OPR1_14621_PCB

NATIVE ANALYTES	SPIKE CONC. (pg/uL)	RECOVERY (%)	RANGE (%)			OK
PCB-1 2-MoCB	50	126	50	-	150	Y
PCB-3 4-MoCB	50	126	50	-	150	Y
PCB-4 22'-DiCB	50	103	50	-	150	Y
PCB-15 44'-DiCB	50	116	50	-	150	Y
PCB-19 22'6-TrCB	50	105	50	-	150	Y
PCB-37 344'-TrCB	50	125	50	-	150	Y
PCB-54 22'66'-TeCB	50	107	50	-	150	Y
PCB-77 33'44'-TeCB	50	130	50	-	150	Y
PCB-81 344'5-TeCB	50	118	50	-	150	Y
PCB-104 22'466'-PeCB	50	117	50	-	150	Y
PCB-105 233'44'-PeCB	50	118	50	-	150	Y
PCB-114 2344'5-PeCB	50	126	50	-	150	Y
PCB-118 23'44'5-PeCB	50	116	50	-	150	Y
PCB-123 23'44'5'-PeCB	50	109	50	-	150	Y
PCB-126 33'44'5-PeCB	50	122	50	-	150	Y
PCB-155 22'44'66'-HxCB	50	118	50	-	150	Y
PCB-156/157 ...-HxCB	100	111	50	-	150	Y
PCB-167 23'44'55'-HxCB	50	115	50	-	150	Y
PCB-169 33'44'55'-HxCB	50	108	50	-	150	Y
PCB-188 22'34'566'-HpCB	50	132	50	-	150	Y
PCB-189 233'44'55'-HpCB	50	126	50	-	150	Y
PCB-202 22'33'55'66'-OcCB	50	96.6	50	-	150	Y
PCB-205 233'44'55'6-OcCB	50	109	50	-	150	Y
PCB-206 22'33'44'55'6-NoCB	50	100	50	-	150	Y
PCB-208 22'33'455'66'-NoCB	50	113	50	-	150	Y
PCB-209 DeCB	50	109	50	-	150	Y

Contract-required recovery limits for OPR as specified in Table 6,
Method 1668A.

Processed: 25 Jan 2017 15:14 Analyst: LB

METHOD 1668A **PCB ONGOING PRECISION AND RECOVERY (OPR)** **FORM 8B**

Lab Name: SGS North America
Initial Calibration: ICAL: MM4_PCB_04072016_13SEPT2016
Instrument ID: MM4 GC Column ID:
VER Data Filename: 170124S02 Analysis Date: 24-JAN-2017 13:12:21
Lab ID: OPR1_14621_PCB

LABELED STANDARDS	SPIKE CONC. (pg/uL)	RECOVERY (%)	RANGE (%)			OK
ES PCB-1	100	63	15	-	140	Y
ES PCB-3	100	62.4	15	-	140	Y
ES PCB-4	100	71.7	30	-	140	Y
ES PCB-15	100	79.9	30	-	140	Y
ES PCB-19	100	75.8	30	-	140	Y
ES PCB-37	100	78.6	30	-	140	Y
ES PCB-54	100	69.8	30	-	140	Y
ES PCB-77	100	103	30	-	140	Y
ES PCB-81	100	104	30	-	140	Y
ES PCB-104	100	70.8	30	-	140	Y
ES PCB-105	100	95.5	30	-	140	Y
ES PCB-114	100	88.2	30	-	140	Y
ES PCB-118	100	89.6	30	-	140	Y
ES PCB-123	100	93.2	30	-	140	Y
ES PCB-126	100	101	30	-	140	Y
ES PCB-153	100	92.4	30	-	140	Y
ES PCB-155	100	78.6	30	-	140	Y
ES PCB-156/157	200	94.5	30	-	140	Y
ES PCB-167	100	92.8	30	-	140	Y
ES PCB-169	100	104	30	-	140	Y
ES PCB-170	100	91.9	30	-	140	Y
ES PCB-180	100	92.8	30	-	140	Y
ES PCB-188	100	72.9	30	-	140	Y
ES PCB-189	100	99.7	30	-	140	Y
ES PCB-202	100	93	30	-	140	Y
ES PCB-205	100	98.8	30	-	140	Y
ES PCB-206	100	105	30	-	140	Y
ES PCB-208	100	100	30	-	140	Y
ES PCB-209	100	109	30	-	140	Y
CLEANUP STANDARDS						
CS PCB-28	100	72.5	40	-	125	Y
CS PCB-111	100	94.4	40	-	125	Y
CS PCB-178	100	75.6	40	-	125	Y

Processed: 25 Jan 2017 15:14 Analyst: LB

Sample Receipt Notification

5500 Business Drive
Wilmington, NC 28405 USA
Tel: 910 794-1613
Toll Free: 866 846-8290
Fax: 910 794-3919

Project Manager:	*Tamara Morgan*
Receipt Date & Time:	*04-Jan-17 at 13:19*
AP Project name:	*A9587*
Requested TAT:	*21 days*
Projected due date:	*25-Jan-17*
Matrix:	*Soil*
Phone#:	*910-794-1613*
Email Address:	*Tamara.Morgan@sgs.com*

Company Contact:	*Melissa D'Almeida*
Company:	*Hampton-Clarke, Inc.*
Project Name & Site:	*6123013*
Project PO#:	*6123013*
QAAP/Contract #:	*N/A*
Requested Analysis:	*Method 1668A*
Phone#:	*800-426-9992*
Email Address:	*mdalmeida@hcvlab.com*

Client Smp ID	AP Smp ID	Sample Condition & Notes	Quantity	Size	Sampling Date	Sampling Time	Received Temp	Container #	Shipping #
AC95422-001	A9587_001	WCSB01	1	8oz Clear	30-Dec-16	12:00	3	1	1Z 1X7 842 13 9002 7645
AC95422-002	A9587_002	WCSB02	1	8oz Clear	30-Dec-16	12:12	3	1	1Z 1X7 842 13 9002 7645
AC95422-003	A9587_003	WCSB03	1	8oz Clear	30-Dec-16	12:33	3	1	1Z 1X7 842 13 9002 7645
AC95422-004	A9587_004	WCSB04	1	8oz Clear	30-Dec-16	11:00	3	1	1Z 1X7 842 13 9002 7645
AC95422-005	A9587_005	WCSB05	1	8oz Clear	30-Dec-16	10:20	3	1	1Z 1X7 842 13 9002 7645
AC95422-006	A9587_006	WCSB06	1	8oz Clear	30-Dec-16	10:10	3	1	1Z 1X7 842 13 9002 7645
AC95422-007	A9587_007	WCSB07	1	8oz Clear	30-Dec-16	11:30	3	1	1Z 1X7 842 13 9002 7645
AC95422-008	A9587_008	WCSB08	1	8oz Clear	30-Dec-16	13:30	3	1	1Z 1X7 842 13 9002 7645
AC95422-009	A9587_009	WCSB09	1	8oz Clear	30-Dec-16	13:45	3	1	1Z 1X7 842 13 9002 7645
AC95422-010	A9587_010	WCSB10	1	8oz Clear	30-Dec-16	14:05	3	1	1Z 1X7 842 13 9002 7645

Preservation Type: **Sample Seals:** No

Notes/Comments:

Samples received intact

Any un-extracted sample will be stored for 90 days from reporting date. Additional storage fees may apply for any samples stored longer than 90 days.

Received by: Ashley Owens *Logged in by: Ashley Owens* *QC'ed by:* AK 4 Jan 17

CHAIN OF CUSTODY RECORD

Hampton-Clarke, Inc.
175 US Hwy 46 West
Fairfield, New Jersey, 07004
Ph:800-426-9992 Fax:973-439-1458

A9587

Report To:
Hampton-Clarke, Inc.:
Attn:Reporting
175 Route 46 West
Fairfield, New Jersey 07004

Invoice To:
Hampton-Clarke, Inc.:
Attn:Accounting
175 Route 46 West
Fairfield, New Jersey 07004

Project #: 6123013

CocID#: 5293

FINAL RESULTS TO: subresults@hcvlab.com
PRELIM/VERBAL RESULTS TO: subresults@hcvlab.com

EDD: NEW JERSEY HAZRESULT OR EQUIS EZEDD REQUIRED FOR ALL DATA SUBMITTALS!

Turn Around Time: Standard
Report Type: NJDEP-R (REDUCED)
Preliminary Due Date: 1/18/2017
Hard Copy Due Date: 1/24/2017

MD 1/3/17

Sample Number:	Client ID	Matrix:	Date Collected:	Time Collected:	Analysis Requested
AC95422-001	WCSB01	Soil/Enc	12/30/2016	12:00:00 PM	PCB Congeners - 1668A
AC95422-002	WCSB02	Soil/Enc	12/30/2016	12:12:00 PM	PCB Congeners - 1668A
AC95422-003	WCSB03	Soil/Enc	12/30/2016	12:33:00 PM	PCB Congeners - 1668A
AC95422-004	WCSB04	Soil/Enc	12/30/2016	11:00:00 AM	PCB Congeners - 1668A
AC95422-005	WCSB05	Soil/Enc	12/30/2016	10:20:00 AM	PCB Congeners - 1668A
AC95422-006	WCSB06	Soil/Enc	12/30/2016	10:10:00 AM	PCB Congeners - 1668A
AC95422-007	WCSB07	Soil/Enc	12/30/2016	11:30:00 AM	PCB Congeners - 1668A
AC95422-008	WCSB08	Soil/Enc	12/30/2016	1:30:00 PM	PCB Congeners - 1668A
AC95422-009	WCSB09	Soil/Enc	12/30/2016	1:45:00 PM	PCB Congeners - 1668A
AC95422-010	WCSB10	Soil/Enc	12/30/2016	2:05:00 PM	PCB Congeners - 1668A

Relinquished By:	Accepted By:	Date:	Time:
UPS	UPS	01/03/17	1700
	Ashley Ortiz	1/4/17	13:19

Comments, Notes, Special Requirements, HAZARDS
UPS: 12 1X7 842 13 9002 7645

Cooler Temp: 3.0°

HC Lab Use Only: Subcontracted Lab Id and Contact: SGS LAB, Richard Sutler, (910) 350-1903, LabID: H, 5500 Business Drive, Wilmington, NC, 28405

Attachment D
(Attached CD)

Fish Tissue Analysis

Laboratory Metals, Pesticides, Percent Lipids Analysis

ANALYTICAL REPORT

Lab Number:	L1701310
Client:	HDR Inc. One International Blvd, 10th Floor Suite 1000 Mahwah, NJ 07495
ATTN:	David Brizzolara
Phone:	(845) 735-8300
Project Name:	EVERGREEN WHALE CREEK
Project Number:	10038062
Report Date:	02/09/17

Certifications & Approvals: NY (11627), CT (PH-0141), NH (2206), NJ NELAP (MA015), RI (LAO00299), ME (MA00030), PA (68-02089), VA (460194), LA NELAP (03090), FL (E87814), TX (T104704419), WA (C954), USFWS (Permit #LE2069641), USDA (Permit #P330-11-00109), US Army Corps of Engineers.

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

Project Name: EVERGREEN WHALE CREEK
Project Number: 10038062

Lab Number: L1701310
Report Date: 02/09/17

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1701310-01	WC-FISH-1	TISSUE	OLD BRIDGE, NJ	01/13/17 10:30	01/13/17
L1701310-02	WC-FISH-2	TISSUE	OLD BRIDGE, NJ	01/13/17 11:00	01/13/17
L1701310-03	WC-FISH-3	TISSUE	OLD BRIDGE, NJ	01/13/17 11:20	01/13/17

Project Name: EVERGREEN WHALE CREEK
Project Number: 10038062

Lab Number: L1701310
Report Date: 02/09/17

NJ DEP Data of Known Quality Protocols
Conformance/Non-Conformance
Summary Questionnaire

1	For each analytical method referenced in this laboratory report package, were all specified QA/QC performance criteria followed, including the requirement to explain any criteria falling outside of acceptable guidelines, as specified in the NJDEP Data of Known Quality performance standards?	YES
1a	Were the method specified handling, preservation, and holding time requirements met?	YES
1b	EPH Method: Was the EPH Method conducted without significant modifications (see Section 11.3 of respective DKQ methods)?	N/A
2	Were all samples received by the laboratory in a condition consistent with that described on the associated chain-of-custody document(s)?	YES
3	Were all samples received at an appropriate temperature (4 ± 2° C)?	YES
4	Were all QA/QC performance criteria specified in the NJDEP DKQP standards achieved?	NO
5a	Were reporting limits specified or referenced on the chain-of-custody or communicated to the laboratory prior to sample receipt?	YES
5b	Were these reporting limits met?	NO
6	For each analytical method referenced in this laboratory report package, were results reported for all constituents identified in the method-specific analyte lists presented in the DKQP documents and/or site-specific QAPP?	YES
7	Are project-specific matrix spikes and/or laboratory duplicates included in this data set?	YES

Note: For all questions to which the response was "No" (with the exception of question #7), additional information must be provided in an attached narrative. If the answer to question #1, #1a or #1b is "No", the data package does not meet the requirements for "Data of Known Quality".

Project Name: EVERGREEN WHALE CREEK **Lab Number:** L1701310
Project Number: 10038062 **Report Date:** 02/09/17

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY
For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

Project Name: EVERGREEN WHALE CREEK **Lab Number:** L1701310
Project Number: 10038062 **Report Date:** 02/09/17

Case Narrative (continued)

Report Submission

The analysis of Dioxin/Furans and PCB congeners was subcontracted to Cape Fear Analytical. A copy of the laboratory report will be issued under separate cover.

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

DKQP Related Narratives

Pesticides

In reference to question 4:

L1701310-01, -02, and -03: One or more dual column RPDs are above the acceptance criteria. Dual column RPDs that exceeded 100% were re-analyzed on dilution and also yielded RPDs > 100%. The re-analysis was performed only for the compound(s) that exceeded the criteria on the original analysis. The results of both analyses are reported. Please refer to the sample results section of the report for specific details.

Metals

In reference to question 4:

The WG971760-3 MS recoveries, performed on L1701310-03, are outside the acceptance criteria for Antimony (164%), Calcium (615%), Magnesium (141%), Potassium (224%) and Sodium (193%); however, the associated LCS recoveries are within overall method allowances. No further action was required.

The WG971760-4 Laboratory Duplicate RPDs, performed on L1701310-03, are outside the acceptance criteria for Calcium (25%), Lead (22%), Magnesium (22%), and Manganese (24%). The elevated RPDs have been attributed to the non-homogeneous nature of the native sample.

In reference to question 5b:

L1701310-01, -02, -03: One or more of the target analytes did not achieve the requested regulatory limits.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Elizabeth Porta

Title: Technical Director/Representative Date: 02/09/17

ORGANICS

PESTICIDES

Project Name: EVERGREEN WHALE CREEK **Lab Number:** L1701310

Project Number: 10038062 **Report Date:** 02/09/17

SAMPLE RESULTS

Lab ID: L1701310-01
Client ID: WC-FISH-1
Sample Location: OLD BRIDGE, NJ
Matrix: Tissue
Analytical Method: 1,8081B
Analytical Date: 02/07/17 15:14
Analyst: DP
Percent Solids: 23%

Date Collected: 01/13/17 10:30
Date Received: 01/13/17
Field Prep: Not Specified
Extraction Method: EPA 3570
Extraction Date: 01/18/17 19:45
Cleanup Method: EPA 3630
Cleanup Date: 01/23/17
Cleanup Method: EPA 3640A

Cleanup Method: EPA 3640A
Cleanup Date: 01/30/17

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
Organochlorine Pesticides by GC - Mansfield Lab							
4,4'-DDD	38.5		ug/kg	1.66	1.66	1	A
4,4'-DDE	81.0		ug/kg	1.66	1.66	1	A
4,4'-DDT	3.01	IP	ug/kg	1.66	1.66	1	A
Aldrin	ND		ug/kg	1.66	1.66	1	A
alpha-BHC	ND		ug/kg	1.66	1.66	1	A
alpha-Chlordane	8.75		ug/kg	1.66	1.66	1	A
beta-BHC	ND		ug/kg	1.66	1.66	1	A
delta-BHC	ND		ug/kg	1.66	1.66	1	A
Dieldrin	12.5	P	ug/kg	1.66	1.66	1	B
Endosulfan I	ND		ug/kg	1.66	1.66	1	A
Endosulfan II	ND		ug/kg	1.66	1.66	1	A
Endosulfan sulfate	ND		ug/kg	1.66	1.66	1	A
Endrin	ND		ug/kg	1.66	1.66	1	A
Endrin aldehyde	ND		ug/kg	4.98	4.98	1	A
Endrin ketone	ND		ug/kg	1.66	1.66	1	A
gamma-BHC	3.35	P	ug/kg	1.66	1.66	1	B
gamma-Chlordane	ND		ug/kg	1.66	1.66	1	A
Heptachlor	ND		ug/kg	1.66	1.66	1	A
Heptachlor epoxide (B)	5.30		ug/kg	3.32	3.32	1	B
Methoxychlor	ND		ug/kg	16.6	16.6	1	A
Toxaphene	ND		ug/kg	83.3	83.3	1	A
Chlordane	ND		ug/kg	83.3	83.3	1	A

Surrogate	% Recovery	Qualifier	Acceptance Criteria	Column
TMX - Surrogate	95		30-150	A
DCB - Surrogate	85		30-150	A
TMX - Surrogate	75		30-150	B
DCB - Surrogate	81		30-150	B

Project Name: EVERGREEN WHALE CREEK **Lab Number:** L1701310

Project Number: 10038062 **Report Date:** 02/09/17

SAMPLE RESULTS

Lab ID: L1701310-01 D
Client ID: WC-FISH-1
Sample Location: OLD BRIDGE, NJ
Matrix: Tissue
Analytical Method: 1,8081B
Analytical Date: 02/08/17 13:33
Analyst: DP
Percent Solids: 23%

Date Collected: 01/13/17 10:30
Date Received: 01/13/17
Field Prep: Not Specified
Extraction Method: EPA 3570
Extraction Date: 01/18/17 19:45
Cleanup Method: EPA 3630
Cleanup Date: 01/23/17
Cleanup Method: EPA 3640A

Cleanup Method: EPA 3640A
Cleanup Date: 01/30/17

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
Organochlorine Pesticides by GC - Mansfield Lab							
4,4'-DDT	ND	IP	ug/kg	3.32	3.32	2	A

Surrogate	% Recovery	Qualifier	Acceptance Criteria	Column
TMX - Surrogate	87		30-150	A
DCB - Surrogate	86		30-150	A
TMX - Surrogate	71		30-150	B
DCB - Surrogate	82		30-150	B

Project Name: EVERGREEN WHALE CREEK **Lab Number:** L1701310

Project Number: 10038062 **Report Date:** 02/09/17

SAMPLE RESULTS

Lab ID: L1701310-02
Client ID: WC-FISH-2
Sample Location: OLD BRIDGE, NJ
Matrix: Tissue
Analytical Method: 1,8081B
Analytical Date: 02/07/17 16:22
Analyst: DP
Percent Solids: 23%

Date Collected: 01/13/17 11:00
Date Received: 01/13/17
Field Prep: Not Specified
Extraction Method: EPA 3570
Extraction Date: 01/26/17 22:01
Cleanup Method: EPA 3630
Cleanup Date: 01/30/17
Cleanup Method: EPA 3640A

Cleanup Method: EPA 3640A
Cleanup Date: 01/30/17

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
Organochlorine Pesticides by GC - Mansfield Lab							
4,4'-DDD	46.5		ug/kg	1.68	1.68	1	A
4,4'-DDE	97.2		ug/kg	1.68	1.68	1	A
4,4'-DDT	3.54	IP	ug/kg	1.68	1.68	1	A
Aldrin	ND		ug/kg	1.68	1.68	1	A
alpha-BHC	ND		ug/kg	1.68	1.68	1	A
alpha-Chlordane	10.7		ug/kg	1.68	1.68	1	A
beta-BHC	ND		ug/kg	1.68	1.68	1	A
delta-BHC	ND		ug/kg	1.68	1.68	1	A
Dieldrin	13.0	P	ug/kg	1.68	1.68	1	B
Endosulfan I	ND		ug/kg	1.68	1.68	1	A
Endosulfan II	ND		ug/kg	1.68	1.68	1	A
Endosulfan sulfate	ND		ug/kg	1.68	1.68	1	A
Endrin	ND		ug/kg	1.68	1.68	1	A
Endrin aldehyde	ND		ug/kg	5.03	5.03	1	A
Endrin ketone	ND		ug/kg	1.68	1.68	1	A
gamma-BHC	2.98		ug/kg	1.68	1.68	1	B
gamma-Chlordane	ND		ug/kg	1.68	1.68	1	A
Heptachlor	ND		ug/kg	1.68	1.68	1	A
Heptachlor epoxide (B)	ND		ug/kg	3.35	3.35	1	B
Methoxychlor	ND		ug/kg	16.8	16.8	1	A
Toxaphene	ND		ug/kg	84.1	84.1	1	A
Chlordane	ND		ug/kg	84.1	84.1	1	A

Surrogate	% Recovery	Qualifier	Acceptance Criteria	Column
TMX - Surrogate	92		30-150	A
DCB - Surrogate	96		30-150	A
TMX - Surrogate	65		30-150	B
DCB - Surrogate	81		30-150	B

Project Name: EVERGREEN WHALE CREEK **Lab Number:** L1701310

Project Number: 10038062 **Report Date:** 02/09/17

SAMPLE RESULTS

Lab ID: L1701310-02 D
Client ID: WC-FISH-2
Sample Location: OLD BRIDGE, NJ
Matrix: Tissue
Analytical Method: 1,8081B
Analytical Date: 02/08/17 14:08
Analyst: DP
Percent Solids: 23%

Date Collected: 01/13/17 11:00
Date Received: 01/13/17
Field Prep: Not Specified
Extraction Method: EPA 3570
Extraction Date: 01/26/17 22:01
Cleanup Method: EPA 3630
Cleanup Date: 01/30/17
Cleanup Method: EPA 3640A

Cleanup Method: EPA 3640A
Cleanup Date: 01/30/17

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
Organochlorine Pesticides by GC - Mansfield Lab							
4,4'-DDT	4.01	IP	ug/kg	3.35	3.35	2	A

Surrogate	% Recovery	Qualifier	Acceptance Criteria	Column
TMX - Surrogate	92		30-150	A
DCB - Surrogate	92		30-150	A
TMX - Surrogate	63		30-150	B
DCB - Surrogate	76		30-150	B

Project Name: EVERGREEN WHALE CREEK **Lab Number:** L1701310

Project Number: 10038062 **Report Date:** 02/09/17

SAMPLE RESULTS

Lab ID: L1701310-03
Client ID: WC-FISH-3
Sample Location: OLD BRIDGE, NJ
Matrix: Tissue
Analytical Method: 1,8081B
Analytical Date: 02/07/17 15:48
Analyst: DP
Percent Solids: 22%

Date Collected: 01/13/17 11:20
Date Received: 01/13/17
Field Prep: Not Specified
Extraction Method: EPA 3570
Extraction Date: 01/18/17 19:45
Cleanup Method: EPA 3630
Cleanup Date: 01/23/17
Cleanup Method: EPA 3640A

Cleanup Method: EPA 3640A
Cleanup Date: 01/30/17

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
Organochlorine Pesticides by GC - Mansfield Lab							
4,4'-DDD	41.9		ug/kg	1.63	1.63	1	A
4,4'-DDE	93.8		ug/kg	1.63	1.63	1	A
4,4'-DDT	3.68	IP	ug/kg	1.63	1.63	1	A
Aldrin	ND		ug/kg	1.63	1.63	1	A
alpha-BHC	ND		ug/kg	1.63	1.63	1	A
alpha-Chlordane	11.8		ug/kg	1.63	1.63	1	A
beta-BHC	ND		ug/kg	1.63	1.63	1	A
delta-BHC	ND		ug/kg	1.63	1.63	1	A
Dieldrin	12.7		ug/kg	1.63	1.63	1	B
Endosulfan I	ND		ug/kg	1.63	1.63	1	A
Endosulfan II	ND		ug/kg	1.63	1.63	1	A
Endosulfan sulfate	ND		ug/kg	1.63	1.63	1	A
Endrin	ND		ug/kg	1.63	1.63	1	A
Endrin aldehyde	ND		ug/kg	4.90	4.90	1	A
Endrin ketone	ND		ug/kg	1.63	1.63	1	A
gamma-BHC	4.89	P	ug/kg	1.63	1.63	1	B
gamma-Chlordane	ND		ug/kg	1.63	1.63	1	A
Heptachlor	ND		ug/kg	1.63	1.63	1	A
Heptachlor epoxide (B)	4.16		ug/kg	3.26	3.26	1	B
Methoxychlor	ND		ug/kg	16.3	16.3	1	A
Toxaphene	ND		ug/kg	81.9	81.9	1	A
Chlordane	ND		ug/kg	81.9	81.9	1	A

Surrogate	% Recovery	Qualifier	Acceptance Criteria	Column
TMX - Surrogate	100		30-150	A
DCB - Surrogate	92		30-150	A
TMX - Surrogate	68		30-150	B
DCB - Surrogate	76		30-150	B

Project Name: EVERGREEN WHALE CREEK **Lab Number:** L1701310

Project Number: 10038062 **Report Date:** 02/09/17

SAMPLE RESULTS

Lab ID: L1701310-03 D
Client ID: WC-FISH-3
Sample Location: OLD BRIDGE, NJ
Matrix: Tissue
Analytical Method: 1,8081B
Analytical Date: 02/08/17 14:42
Analyst: DP
Percent Solids: 22%

Date Collected: 01/13/17 11:20
Date Received: 01/13/17
Field Prep: Not Specified
Extraction Method: EPA 3570
Extraction Date: 01/18/17 19:45
Cleanup Method: EPA 3630
Cleanup Date: 01/23/17
Cleanup Method: EPA 3640A

Cleanup Method: EPA 3640A
Cleanup Date: 01/30/17

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
Organochlorine Pesticides by GC - Mansfield Lab							
4,4'-DDT	4.03	IP	ug/kg	3.26	3.26	2	A

Surrogate	% Recovery	Qualifier	Acceptance Criteria	Column
TMX - Surrogate	89		30-150	A
DCB - Surrogate	89		30-150	A
TMX - Surrogate	68		30-150	B
DCB - Surrogate	77		30-150	B

Project Name: EVERGREEN WHALE CREEK
Project Number: 10038062
Lab Number: L1701310
Report Date: 02/09/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8081B
Analytical Date: 02/07/17 12:23
Analyst: DP

Extraction Method: EPA 3570
Extraction Date: 01/18/17 19:45
Cleanup Method: EPA 3630
Cleanup Date: 01/23/17
Cleanup Method: EPA 3640A

Cleanup Method: EPA 3640A
Cleanup Date: 01/30/17

Parameter	Result	Qualifier	Units	RL	MDL	Column
Organochlorine Pesticides by GC - Mansfield Lab for sample(s): 01,03 Batch: WG970713-1						
4,4'-DDD	ND		ug/kg	0.400	0.400	A
4,4'-DDE	ND		ug/kg	0.400	0.400	A
4,4'-DDT	ND		ug/kg	0.400	0.400	A
Aldrin	ND		ug/kg	0.400	0.400	A
alpha-BHC	ND		ug/kg	0.400	0.400	A
alpha-Chlordane	ND		ug/kg	0.400	0.400	A
beta-BHC	ND		ug/kg	0.400	0.400	A
delta-BHC	ND		ug/kg	0.400	0.400	A
Dieldrin	ND		ug/kg	0.400	0.400	A
Endosulfan I	ND		ug/kg	0.400	0.400	A
Endosulfan II	ND		ug/kg	0.400	0.400	A
Endosulfan sulfate	ND		ug/kg	0.400	0.400	A
Endrin	ND		ug/kg	0.400	0.400	A
Endrin aldehyde	ND		ug/kg	1.20	1.20	A
Endrin ketone	ND		ug/kg	0.400	0.400	A
gamma-BHC	ND		ug/kg	0.400	0.400	A
gamma-Chlordane	ND		ug/kg	0.400	0.400	A
Heptachlor	ND		ug/kg	0.400	0.400	A
Methoxychlor	ND		ug/kg	4.00	4.00	A
Toxaphene	ND		ug/kg	20.1	20.1	A
Chlordane	ND		ug/kg	20.1	20.1	A
Heptachlor epoxide (B)	ND		ug/kg	0.800	0.800	B

Project Name: EVERGREEN WHALE CREEK
Project Number: 10038062
Lab Number: L1701310
Report Date: 02/09/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8081B
Analytical Date: 02/07/17 12:23
Analyst: DP

Extraction Method: EPA 3570
Extraction Date: 01/18/17 19:45
Cleanup Method: EPA 3630
Cleanup Date: 01/23/17
Cleanup Method: EPA 3640A

Cleanup Method: EPA 3640A
Cleanup Date: 01/30/17

Parameter	Result	Qualifier	Units	RL	MDL
Organochlorine Pesticides by GC - Mansfield Lab for sample(s): 01,03 Batch: WG970713-1					

Surrogate	%Recovery	Qualifier	Acceptance Criteria	Column
TMX - Surrogate	75		30-150	A
DCB - Surrogate	82		30-150	A
TMX - Surrogate	71		30-150	B
DCB - Surrogate	86		30-150	B

Project Name: EVERGREEN WHALE CREEK
Project Number: 10038062
Lab Number: L1701310
Report Date: 02/09/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8081B
Analytical Date: 02/07/17 11:49
Analyst: DP

Extraction Method: EPA 3570
Extraction Date: 01/26/17 22:01
Cleanup Method: EPA 3630
Cleanup Date: 01/30/17
Cleanup Method: EPA 3640A

Cleanup Method: EPA 3640A
Cleanup Date: 01/30/17

Parameter	Result	Qualifier	Units	RL	MDL	Column
Organochlorine Pesticides by GC - Mansfield Lab for sample(s): 02 Batch: WG972922-1						
4,4'-DDD	ND		ug/kg	0.400	0.400	A
4,4'-DDE	ND		ug/kg	0.400	0.400	A
4,4'-DDT	ND		ug/kg	0.400	0.400	A
Aldrin	ND		ug/kg	0.400	0.400	A
alpha-BHC	ND		ug/kg	0.400	0.400	A
alpha-Chlordane	ND		ug/kg	0.400	0.400	A
beta-BHC	ND		ug/kg	0.400	0.400	A
delta-BHC	ND		ug/kg	0.400	0.400	A
Dieldrin	ND		ug/kg	0.400	0.400	A
Endosulfan I	ND		ug/kg	0.400	0.400	A
Endosulfan II	ND		ug/kg	0.400	0.400	A
Endosulfan sulfate	ND		ug/kg	0.400	0.400	A
Endrin	ND		ug/kg	0.400	0.400	A
Endrin aldehyde	ND		ug/kg	1.20	1.20	A
Endrin ketone	ND		ug/kg	0.400	0.400	A
gamma-BHC	ND		ug/kg	0.400	0.400	A
gamma-Chlordane	ND		ug/kg	0.400	0.400	A
Heptachlor	ND		ug/kg	0.400	0.400	A
Methoxychlor	ND		ug/kg	4.00	4.00	A
Toxaphene	ND		ug/kg	20.1	20.1	A
Chlordane	ND		ug/kg	20.1	20.1	A
Heptachlor epoxide (B)	ND		ug/kg	0.800	0.800	B

Project Name: EVERGREEN WHALE CREEK
Project Number: 10038062
Lab Number: L1701310
Report Date: 02/09/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8081B
Analytical Date: 02/07/17 11:49
Analyst: DP

Extraction Method: EPA 3570
Extraction Date: 01/26/17 22:01
Cleanup Method: EPA 3630
Cleanup Date: 01/30/17
Cleanup Method: EPA 3640A

Cleanup Method: EPA 3640A
Cleanup Date: 01/30/17

Parameter	Result	Qualifier	Units	RL	MDL
Organochlorine Pesticides by GC - Mansfield Lab for sample(s): 02 Batch: WG972922-1					

Surrogate	%Recovery	Qualifier	Acceptance Criteria	Column
TMX - Surrogate	69		30-150	A
DCB - Surrogate	74		30-150	A
TMX - Surrogate	67		30-150	B
DCB - Surrogate	78		30-150	B

Lab Control Sample Analysis

Batch Quality Control

Project Name: EVERGREEN WHALE CREEK

Project Number: 10038062

Lab Number: L1701310

Report Date: 02/09/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	Column
Organochlorine Pesticides by GC - Mansfield Lab Associated sample(s): 01,03 Batch: WG970713-2 WG970713-3									
4,4'-DDD	84		84		40-140	0		30	A
4,4'-DDE	84		82		40-140	2		30	A
4,4'-DDT	82		82		40-140	0		30	A
Aldrin	81		77		40-140	5		30	A
alpha-BHC	86		84		40-140	2		30	A
alpha-Chlordane	81		79		40-140	3		30	A
cis-Nonachlor	83		82		40-140	1		30	A
beta-BHC	76		74		40-140	3		30	A
delta-BHC	82		82		40-140	0		30	A
Dieldrin	84		83		40-140	1		30	A
Endosulfan I	81		80		40-140	1		30	A
Endosulfan II	78		78		40-140	0		30	A
Endosulfan sulfate	76		75		40-140	1		30	A
Endrin	72		69		40-140	4		30	A
Endrin aldehyde	71		68		40-140	4		30	A
Endrin ketone	78		79		40-140	1		30	A
Hexachlorobenzene	78		75		40-140	4		30	A
gamma-BHC	84		82		40-140	2		30	A
gamma-Chlordane	82		80		40-140	2		30	A
Heptachlor	80		74		40-140	8		30	A
2,4'-DDE	83		81		40-140	2		30	A

Lab Control Sample Analysis

Batch Quality Control

Project Name: EVERGREEN WHALE CREEK

Project Number: 10038062

Lab Number: L1701310

Report Date: 02/09/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	
Organochlorine Pesticides by GC - Mansfield Lab Associated sample(s): 01,03 Batch: WG970713-2 WG970713-3									
2,4'-DDD	82		82		40-140	0		30	A
2,4'-DDT	81		80		40-140	1		30	A
trans-Nonachlor	82		80		40-140	2		30	A
Mirex	78		76		40-140	3		30	A

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria	Column
TMX - Surrogate	78		75		30-150	A
DCB - Surrogate	78		78		30-150	A
TMX - Surrogate	71		68		30-150	B
DCB - Surrogate	79		78		30-150	B

Lab Control Sample Analysis

Batch Quality Control

Project Name: EVERGREEN WHALE CREEK

Project Number: 10038062

Lab Number: L1701310

Report Date: 02/09/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	Column
Organochlorine Pesticides by GC - Mansfield Lab Associated sample(s): 01,03 Batch: WG970713-2 WG970713-3									
Heptachlor epoxide (B)	83		81		40-140	2		30	B

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria	Column
TMX - Surrogate	78		75		30-150	A
DCB - Surrogate	78		78		30-150	A
TMX - Surrogate	71		68		30-150	B
DCB - Surrogate	79		78		30-150	B

Lab Control Sample Analysis
Batch Quality Control

Project Name: EVERGREEN WHALE CREEK
Project Number: 10038062

Lab Number: L1701310
Report Date: 02/09/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	Column
Organochlorine Pesticides by GC - Mansfield Lab Associated sample(s): 02 Batch: WG972922-2 WG972922-3									
4,4'-DDD	85		81		40-140	5		30	A
4,4'-DDE	84		79		40-140	6		30	A
4,4'-DDT	82		78		40-140	5		30	A
Aldrin	76		74		40-140	3		30	A
alpha-BHC	82		82		40-140	0		30	A
alpha-Chlordane	80		78		40-140	3		30	A
cis-Nonachlor	82		80		40-140	2		30	A
beta-BHC	73		72		40-140	1		30	A
delta-BHC	80		78		40-140	3		30	A
Dieldrin	83		82		40-140	1		30	A
Endosulfan I	80		78		40-140	3		30	A
Endosulfan II	75		76		40-140	1		30	A
Endosulfan sulfate	71		72		40-140	1		30	A
Endrin	70		70		40-140	0		30	A
Endrin aldehyde	66		65		40-140	2		30	A
Endrin ketone	76		76		40-140	0		30	A
Hexachlorobenzene	72		72		40-140	0		30	A
gamma-BHC	80		81		40-140	1		30	A
gamma-Chlordane	80		78		40-140	3		30	A
Heptachlor	75		76		40-140	1		30	A
Methoxychlor	69		66		40-140	4		30	A

Lab Control Sample Analysis

Batch Quality Control

Project Name: EVERGREEN WHALE CREEK

Project Number: 10038062

Lab Number: L1701310

Report Date: 02/09/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	
Organochlorine Pesticides by GC - Mansfield Lab Associated sample(s): 02 Batch: WG972922-2 WG972922-3									
2,4'-DDE	82		79		40-140	4		30	A
2,4'-DDD	82		79		40-140	4		30	A
2,4'-DDT	81		77		40-140	5		30	A
trans-Nonachlor	80		79		40-140	1		30	A
Mirex	77		74		40-140	4		30	A

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria	Column
TMX - Surrogate	68		68		30-150	A
DCB - Surrogate	74		70		30-150	A
TMX - Surrogate	65		61		30-150	B
DCB - Surrogate	75		71		30-150	B

Lab Control Sample Analysis

Batch Quality Control

Project Name: EVERGREEN WHALE CREEK

Project Number: 10038062

Lab Number: L1701310

Report Date: 02/09/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	Column
Organochlorine Pesticides by GC - Mansfield Lab Associated sample(s): 02 Batch: WG972922-2 WG972922-3									
Heptachlor epoxide (B)	82		82		40-140	0		30	B
Oxychlordane	82		82		40-140	0		30	B

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria	Column
TMX - Surrogate	68		68		30-150	A
DCB - Surrogate	74		70		30-150	A
TMX - Surrogate	65		61		30-150	B
DCB - Surrogate	75		71		30-150	B

Matrix Spike Analysis
Batch Quality Control

Project Name: EVERGREEN WHALE CREEK
Project Number: 10038062

Lab Number: L1701310
Report Date: 02/09/17

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits	Column
Organochlorine Pesticides by GC - Mansfield Lab Associated sample(s): 02 QC Batch ID: WG972922-4 QC Sample: L1701310-02 Client ID: WC-FISH-2													
4,4'-DDD	46.5	409	461	101		-	-		30-150	-		30	A
4,4'-DDE	97.2	409	509	101		-	-		30-150	-		30	A
4,4'-DDT	3.54	409	390	95		-	-		30-150	-		30	A
Aldrin	ND	409	400	98		-	-		30-150	-		30	A
Alpha-BHC	ND	409	407	100		-	-		30-150	-		30	A
cis-Chlordane	10.7	409	376	89		-	-		30-150	-		30	A
cis-Nonachlor	8.08	409	387	93		-	-		30-150	-		30	A
Beta-BHC	ND	409	358	88		-	-		30-150	-		30	A
Delta-BHC	ND	409	401P	98		-	-		30-150	-		30	A
Dieldrin	ND	409	401	96		-	-		30-150	-		30	A
Endosulfan I	ND	409	370	91		-	-		30-150	-		30	A
Endosulfan II	ND	409	386	95		-	-		30-150	-		30	A
Endosulfan sulfate	ND	409	388	95		-	-		30-150	-		30	A
Endrin	ND	409	359	88		-	-		30-150	-		30	A
Endrin aldehyde	ND	409	141	35		-	-		30-150	-		30	A
Endrin ketone	ND	409	384	94		-	-		30-150	-		30	A
Hexachlorobenzene	ND	409	405	99		-	-		30-150	-		30	A
gamma-BHC	ND	409	437	106		-	-		30-150	-		30	A
trans-Chlordane	ND	409	367	90		-	-		30-150	-		30	A
Heptachlor	ND	409	381	93		-	-		30-150	-		30	A
Heptachlor epoxide	ND	409	312	76		-	-		30-150	-		30	B

Matrix Spike Analysis
Batch Quality Control

Project Name: EVERGREEN WHALE CREEK
Project Number: 10038062
Lab Number: L1701310
Report Date: 02/09/17

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Organochlorine Pesticides by GC - Mansfield Lab Associated sample(s): 02 QC Batch ID: WG972922-4 QC Sample: L1701310-02 Client ID: WC-FISH-2												
Oxychlordane	6.57	409	310	74		-	-		30-150	-		30 B
2,4'-DDE	ND	409	370	91		-	-		30-150	-		30 A
2,4'-DDD	ND	409	402	98		-	-		30-150	-		30 A
2,4'-DDT	ND	409	382	94		-	-		30-150	-		30 A
trans-Nonachlor	16.0	409	396	93		-	-		30-150	-		30 A
Mirex	ND	409	401	98		-	-		30-150	-		30 A

Surrogate	MS % Recovery	MS Qualifier	MSD % Recovery	MSD Qualifier	Acceptance Criteria	Column
Decachlorobiphenyl	97				30-150	A
Tetrachloro-meta-Xylene	104				30-150	A
Decachlorobiphenyl	81				30-150	B
Tetrachloro-meta-Xylene	73				30-150	B

Lab Duplicate Analysis
Batch Quality Control

Project Name: EVERGREEN WHALE CREEK
Project Number: 10038062

Lab Number: L1701310
Report Date: 02/09/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits	
Organochlorine Pesticides by GC - Mansfield Lab Associated sample(s): 02 QC Batch ID: WG972922-5 QC Sample: L1701310-02 Client ID: WC-FISH-2							
4,4'-DDD	46.5	45.4	ug/kg	2		30	A
4,4'-DDE	97.2	96.3	ug/kg	1		30	A
4,4'-DDT	3.54	3.40IP	ug/kg	4		30	A
Aldrin	ND	ND	ug/kg	NC		30	A
alpha-BHC	ND	ND	ug/kg	NC		30	A
alpha-Chlordane	10.7	10.6	ug/kg	1		30	A
beta-BHC	ND	ND	ug/kg	NC		30	A
delta-BHC	ND	ND	ug/kg	NC		30	A
Dieldrin	13.0	13.4P	ug/kg	3		30	B
Endosulfan I	ND	ND	ug/kg	NC		30	A
Endosulfan II	ND	ND	ug/kg	NC		30	A
Endosulfan sulfate	ND	ND	ug/kg	NC		30	A
Endrin	ND	ND	ug/kg	NC		30	A
Endrin aldehyde	ND	ND	ug/kg	NC		30	A
Endrin ketone	ND	ND	ug/kg	NC		30	A
gamma-BHC	2.98	2.81	ug/kg	6		30	B
gamma-Chlordane	ND	ND	ug/kg	NC		30	A
Heptachlor	ND	ND	ug/kg	NC		30	A
Heptachlor epoxide (B)	ND	ND	ug/kg	NC		30	B

Lab Duplicate Analysis
Batch Quality Control

Project Name: EVERGREEN WHALE CREEK
Project Number: 10038062

Lab Number: L1701310
Report Date: 02/09/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits	
Organochlorine Pesticides by GC - Mansfield Lab Associated sample(s): 02 QC Batch ID: WG972922-5 QC Sample: L1701310-02 Client ID: WC-FISH-2							
Methoxychlor	ND	ND	ug/kg	NC		30	A
Toxaphene	ND	ND	ug/kg	NC		30	A
Chlordane	ND	ND	ug/kg	NC		30	A

Surrogate	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria	Column
TMX - Surrogate	92		85		30-150	A
DCB - Surrogate	96		92		30-150	A
TMX - Surrogate	65		64		30-150	B
DCB - Surrogate	81		80		30-150	B

METALS

Project Name: EVERGREEN WHALE CREEK
Project Number: 10038062
Lab Number: L1701310
Report Date: 02/09/17

SAMPLE RESULTS

Lab ID: L1701310-01
Client ID: WC-FISH-1
Sample Location: OLD BRIDGE, NJ
Matrix: Tissue
Percent Solids: 23%

Date Collected: 01/13/17 10:30
Date Received: 01/13/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Aluminum, Total	226	J	mg/kg	238	41.9	10	01/31/17 12:16	02/01/17 10:39	EPA 3051A	1,6020A	DB
Antimony, Total	0.530	J	mg/kg	1.19	0.126	10	01/31/17 12:16	02/01/17 10:39	EPA 3051A	1,6020A	DB
Arsenic, Total	3.19		mg/kg	2.38	0.134	10	01/31/17 12:16	02/01/17 10:39	EPA 3051A	1,6020A	DB
Barium, Total	6.69		mg/kg	1.19	0.170	10	01/31/17 12:16	02/01/17 10:39	EPA 3051A	1,6020A	DB
Beryllium, Total	ND		mg/kg	1.19	0.094	10	01/31/17 12:16	02/01/17 10:39	EPA 3051A	1,6020A	DB
Cadmium, Total	ND		mg/kg	0.476	0.042	10	01/31/17 12:16	02/01/17 10:39	EPA 3051A	1,6020A	DB
Calcium, Total	84400		mg/kg	476	33.7	10	01/31/17 12:16	02/01/17 10:39	EPA 3051A	1,6020A	DB
Chromium, Total	2.76		mg/kg	1.19	0.259	10	01/31/17 12:16	02/01/17 10:39	EPA 3051A	1,6020A	DB
Cobalt, Total	0.383	J	mg/kg	1.19	0.072	10	01/31/17 12:16	02/01/17 10:39	EPA 3051A	1,6020A	DB
Copper, Total	20.5		mg/kg	1.19	0.260	10	01/31/17 12:16	02/01/17 10:39	EPA 3051A	1,6020A	DB
Iron, Total	597		mg/kg	238	26.5	10	01/31/17 12:16	02/01/17 10:39	EPA 3051A	1,6020A	DB
Lead, Total	0.782		mg/kg	0.476	0.058	10	01/31/17 12:16	02/01/17 10:39	EPA 3051A	1,6020A	DB
Magnesium, Total	2660		mg/kg	238	24.9	10	01/31/17 12:16	02/01/17 10:39	EPA 3051A	1,6020A	DB
Manganese, Total	84.4		mg/kg	2.38	0.254	10	01/31/17 12:16	02/01/17 10:39	EPA 3051A	1,6020A	DB
Mercury, Total	0.067		mg/kg	0.060	0.017	5	01/30/17 17:00	02/01/17 16:20	EPA 7474	1,7474	LC
Nickel, Total	0.968	J	mg/kg	1.19	0.278	10	01/31/17 12:16	02/01/17 10:39	EPA 3051A	1,6020A	DB
Potassium, Total	16500		mg/kg	238	28.9	10	01/31/17 12:16	02/01/17 10:39	EPA 3051A	1,6020A	DB
Selenium, Total	3.18		mg/kg	2.38	0.368	10	01/31/17 12:16	02/01/17 10:39	EPA 3051A	1,6020A	DB
Silver, Total	0.536	J	mg/kg	1.19	0.048	10	01/31/17 12:16	02/01/17 10:39	EPA 3051A	1,6020A	DB
Sodium, Total	9570		mg/kg	238	34.7	10	01/31/17 12:16	02/01/17 10:39	EPA 3051A	1,6020A	DB
Thallium, Total	ND		mg/kg	0.476	0.016	10	01/31/17 12:16	02/01/17 10:39	EPA 3051A	1,6020A	DB
Vanadium, Total	1.25	J	mg/kg	11.9	0.250	10	01/31/17 12:16	02/01/17 10:39	EPA 3051A	1,6020A	DB
Zinc, Total	242		mg/kg	11.9	1.66	10	01/31/17 12:16	02/01/17 10:39	EPA 3051A	1,6020A	DB

Project Name: EVERGREEN WHALE CREEK
Lab Number: L1701310
Project Number: 10038062
Report Date: 02/09/17

SAMPLE RESULTS

Lab ID: L1701310-02
Client ID: WC-FISH-2
Sample Location: OLD BRIDGE, NJ
Matrix: Tissue
Percent Solids: 23%

Date Collected: 01/13/17 11:00
Date Received: 01/13/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Aluminum, Total	252		mg/kg	224	39.5	10	01/31/17 12:16	02/01/17 10:41	EPA 3051A	1,6020A	DB
Antimony, Total	0.341	J	mg/kg	1.12	0.118	10	01/31/17 12:16	02/01/17 10:41	EPA 3051A	1,6020A	DB
Arsenic, Total	2.27		mg/kg	2.24	0.126	10	01/31/17 12:16	02/01/17 10:41	EPA 3051A	1,6020A	DB
Barium, Total	6.73		mg/kg	1.12	0.160	10	01/31/17 12:16	02/01/17 10:41	EPA 3051A	1,6020A	DB
Beryllium, Total	ND		mg/kg	1.12	0.088	10	01/31/17 12:16	02/01/17 10:41	EPA 3051A	1,6020A	DB
Cadmium, Total	ND		mg/kg	0.448	0.040	10	01/31/17 12:16	02/01/17 10:41	EPA 3051A	1,6020A	DB
Calcium, Total	66400		mg/kg	448	31.8	10	01/31/17 12:16	02/01/17 10:41	EPA 3051A	1,6020A	DB
Chromium, Total	1.49		mg/kg	1.12	0.244	10	01/31/17 12:16	02/01/17 10:41	EPA 3051A	1,6020A	DB
Cobalt, Total	0.304	J	mg/kg	1.12	0.067	10	01/31/17 12:16	02/01/17 10:41	EPA 3051A	1,6020A	DB
Copper, Total	17.4		mg/kg	1.12	0.245	10	01/31/17 12:16	02/01/17 10:41	EPA 3051A	1,6020A	DB
Iron, Total	502		mg/kg	224	25.0	10	01/31/17 12:16	02/01/17 10:41	EPA 3051A	1,6020A	DB
Lead, Total	0.715		mg/kg	0.448	0.054	10	01/31/17 12:16	02/01/17 10:41	EPA 3051A	1,6020A	DB
Magnesium, Total	2090		mg/kg	224	23.5	10	01/31/17 12:16	02/01/17 10:41	EPA 3051A	1,6020A	DB
Manganese, Total	69.8		mg/kg	2.24	0.239	10	01/31/17 12:16	02/01/17 10:41	EPA 3051A	1,6020A	DB
Mercury, Total	0.064		mg/kg	0.056	0.016	5	01/30/17 17:00	02/01/17 16:22	EPA 7474	1,7474	LC
Nickel, Total	0.665	J	mg/kg	1.12	0.262	10	01/31/17 12:16	02/01/17 10:41	EPA 3051A	1,6020A	DB
Potassium, Total	13100		mg/kg	224	27.2	10	01/31/17 12:16	02/01/17 10:41	EPA 3051A	1,6020A	DB
Selenium, Total	2.83		mg/kg	2.24	0.346	10	01/31/17 12:16	02/01/17 10:41	EPA 3051A	1,6020A	DB
Silver, Total	0.415	J	mg/kg	1.12	0.045	10	01/31/17 12:16	02/01/17 10:41	EPA 3051A	1,6020A	DB
Sodium, Total	7820		mg/kg	224	32.7	10	01/31/17 12:16	02/01/17 10:41	EPA 3051A	1,6020A	DB
Thallium, Total	ND		mg/kg	0.448	0.015	10	01/31/17 12:16	02/01/17 10:41	EPA 3051A	1,6020A	DB
Vanadium, Total	1.17	J	mg/kg	11.2	0.235	10	01/31/17 12:16	02/01/17 10:41	EPA 3051A	1,6020A	DB
Zinc, Total	190		mg/kg	11.2	1.56	10	01/31/17 12:16	02/01/17 10:41	EPA 3051A	1,6020A	DB

Project Name: EVERGREEN WHALE CREEK
Project Number: 10038062
Lab Number: L1701310
Report Date: 02/09/17

SAMPLE RESULTS

Lab ID: L1701310-03
Client ID: WC-FISH-3
Sample Location: OLD BRIDGE, NJ
Matrix: Tissue
Percent Solids: 22%

Date Collected: 01/13/17 11:20
Date Received: 01/13/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Aluminum, Total	204	J	mg/kg	248	43.6	10	01/31/17 12:16	02/01/17 10:43	EPA 3051A	1,6020A	DB
Antimony, Total	0.283	J	mg/kg	1.24	0.131	10	01/31/17 12:16	02/01/17 10:43	EPA 3051A	1,6020A	DB
Arsenic, Total	2.16	J	mg/kg	2.48	0.139	10	01/31/17 12:16	02/01/17 10:43	EPA 3051A	1,6020A	DB
Barium, Total	5.63		mg/kg	1.24	0.177	10	01/31/17 12:16	02/01/17 10:43	EPA 3051A	1,6020A	DB
Beryllium, Total	ND		mg/kg	1.24	0.098	10	01/31/17 12:16	02/01/17 10:43	EPA 3051A	1,6020A	DB
Cadmium, Total	ND		mg/kg	0.495	0.044	10	01/31/17 12:16	02/01/17 10:43	EPA 3051A	1,6020A	DB
Calcium, Total	62500		mg/kg	495	35.1	10	01/31/17 12:16	02/01/17 10:43	EPA 3051A	1,6020A	DB
Chromium, Total	1.43		mg/kg	1.24	0.269	10	01/31/17 12:16	02/01/17 10:43	EPA 3051A	1,6020A	DB
Cobalt, Total	0.259	J	mg/kg	1.24	0.075	10	01/31/17 12:16	02/01/17 10:43	EPA 3051A	1,6020A	DB
Copper, Total	15.2		mg/kg	1.24	0.270	10	01/31/17 12:16	02/01/17 10:43	EPA 3051A	1,6020A	DB
Iron, Total	440		mg/kg	248	27.6	10	01/31/17 12:16	02/01/17 10:43	EPA 3051A	1,6020A	DB
Lead, Total	0.566		mg/kg	0.495	0.060	10	01/31/17 12:16	02/01/17 10:43	EPA 3051A	1,6020A	DB
Magnesium, Total	1940		mg/kg	248	25.9	10	01/31/17 12:16	02/01/17 10:43	EPA 3051A	1,6020A	DB
Manganese, Total	58.8		mg/kg	2.48	0.264	10	01/31/17 12:16	02/01/17 10:43	EPA 3051A	1,6020A	DB
Mercury, Total	0.059	J	mg/kg	0.062	0.018	5	01/30/17 17:00	02/01/17 16:25	EPA 7474	1,7474	LC
Nickel, Total	0.523	J	mg/kg	1.24	0.290	10	01/31/17 12:16	02/01/17 10:43	EPA 3051A	1,6020A	DB
Potassium, Total	11700		mg/kg	248	30.0	10	01/31/17 12:16	02/01/17 10:43	EPA 3051A	1,6020A	DB
Selenium, Total	2.05	J	mg/kg	2.48	0.382	10	01/31/17 12:16	02/01/17 10:43	EPA 3051A	1,6020A	DB
Silver, Total	0.334	J	mg/kg	1.24	0.050	10	01/31/17 12:16	02/01/17 10:43	EPA 3051A	1,6020A	DB
Sodium, Total	7300		mg/kg	248	36.1	10	01/31/17 12:16	02/01/17 10:43	EPA 3051A	1,6020A	DB
Thallium, Total	ND		mg/kg	0.495	0.016	10	01/31/17 12:16	02/01/17 10:43	EPA 3051A	1,6020A	DB
Vanadium, Total	0.690	J	mg/kg	12.4	0.260	10	01/31/17 12:16	02/01/17 10:43	EPA 3051A	1,6020A	DB
Zinc, Total	180		mg/kg	12.4	1.73	10	01/31/17 12:16	02/01/17 10:43	EPA 3051A	1,6020A	DB

Project Name: EVERGREEN WHALE CREEK **Lab Number:** L1701310

Project Number: 10038062 **Report Date:** 02/09/17

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-03 Batch: WG971760-1										
Aluminum, Total	ND		mg/kg	50.0	8.81	10	01/31/17 12:16	02/01/17 10:35	1,6020A	DB
Antimony, Total	0.096	J	mg/kg	0.250	0.026	10	01/31/17 12:16	02/01/17 10:35	1,6020A	DB
Arsenic, Total	ND		mg/kg	0.500	0.028	10	01/31/17 12:16	02/01/17 10:35	1,6020A	DB
Barium, Total	ND		mg/kg	0.250	0.036	10	01/31/17 12:16	02/01/17 10:35	1,6020A	DB
Beryllium, Total	ND		mg/kg	0.250	0.020	10	01/31/17 12:16	02/01/17 10:35	1,6020A	DB
Cadmium, Total	ND		mg/kg	0.100	0.009	10	01/31/17 12:16	02/01/17 10:35	1,6020A	DB
Calcium, Total	ND		mg/kg	100	7.09	10	01/31/17 12:16	02/01/17 10:35	1,6020A	DB
Chromium, Total	ND		mg/kg	0.250	0.054	10	01/31/17 12:16	02/01/17 10:35	1,6020A	DB
Cobalt, Total	ND		mg/kg	0.250	0.015	10	01/31/17 12:16	02/01/17 10:35	1,6020A	DB
Copper, Total	ND		mg/kg	0.250	0.055	10	01/31/17 12:16	02/01/17 10:35	1,6020A	DB
Iron, Total	ND		mg/kg	50.0	5.57	10	01/31/17 12:16	02/01/17 10:35	1,6020A	DB
Lead, Total	ND		mg/kg	0.100	0.012	10	01/31/17 12:16	02/01/17 10:35	1,6020A	DB
Magnesium, Total	ND		mg/kg	50.0	5.24	10	01/31/17 12:16	02/01/17 10:35	1,6020A	DB
Manganese, Total	ND		mg/kg	0.500	0.053	10	01/31/17 12:16	02/01/17 10:35	1,6020A	DB
Nickel, Total	ND		mg/kg	0.250	0.059	10	01/31/17 12:16	02/01/17 10:35	1,6020A	DB
Potassium, Total	ND		mg/kg	50.0	6.07	10	01/31/17 12:16	02/01/17 10:35	1,6020A	DB
Selenium, Total	ND		mg/kg	0.500	0.077	10	01/31/17 12:16	02/01/17 10:35	1,6020A	DB
Silver, Total	ND		mg/kg	0.250	0.010	10	01/31/17 12:16	02/01/17 10:35	1,6020A	DB
Sodium, Total	ND		mg/kg	50.0	7.30	10	01/31/17 12:16	02/01/17 10:35	1,6020A	DB
Thallium, Total	ND		mg/kg	0.100	0.003	10	01/31/17 12:16	02/01/17 10:35	1,6020A	DB
Vanadium, Total	ND		mg/kg	2.50	0.053	10	01/31/17 12:16	02/01/17 10:35	1,6020A	DB
Zinc, Total	ND		mg/kg	2.50	0.349	10	01/31/17 12:16	02/01/17 10:35	1,6020A	DB

Prep Information

Digestion Method: EPA 3051A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-03 Batch: WG971763-1										
Mercury, Total	ND		mg/kg	0.013	0.004	5	01/30/17 17:00	02/01/17 16:13	1,7474	LC

Project Name: EVERGREEN WHALE CREEK
Project Number: 10038062
Lab Number: L1701310
Report Date: 02/09/17

Method Blank Analysis
Batch Quality Control

Prep Information

Digestion Method: EPA 7474

Lab Control Sample Analysis

Batch Quality Control

Project Name: EVERGREEN WHALE CREEK

Project Number: 10038062

Lab Number: L1701310

Report Date: 02/09/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-03 Batch: WG971760-2 SRM Lot Number: A2METSPIKE								
Aluminum, Total	99		-		75-125	-		20
Antimony, Total	106		-		75-125	-		20
Arsenic, Total	96		-		75-125	-		20
Barium, Total	101		-		75-125	-		20
Beryllium, Total	97		-		75-125	-		20
Cadmium, Total	101		-		75-125	-		20
Calcium, Total	117		-		75-125	-		20
Chromium, Total	98		-		75-125	-		20
Cobalt, Total	98		-		75-125	-		20
Copper, Total	100		-		75-125	-		20
Iron, Total	105		-		75-125	-		20
Lead, Total	106		-		75-125	-		20
Magnesium, Total	105		-		75-125	-		20
Manganese, Total	99		-		75-125	-		20
Nickel, Total	101		-		75-125	-		20
Potassium, Total	107		-		75-125	-		20
Selenium, Total	97		-		75-125	-		20
Silver, Total	104		-		75-125	-		20
Sodium, Total	104		-		75-125	-		20
Thallium, Total	99		-		75-125	-		20
Vanadium, Total	98		-		75-125	-		20

Lab Control Sample Analysis

Batch Quality Control

Project Name: EVERGREEN WHALE CREEK

Project Number: 10038062

Lab Number: L1701310

Report Date: 02/09/17

Parameter	LCS %Recovery	LCSD %Recovery	%Recovery Limits	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-03 Batch: WG971760-2 SRM Lot Number: A2METSPIKE					
Zinc, Total	99	-	75-125	-	20
Total Metals - Mansfield Lab Associated sample(s): 01-03 Batch: WG971763-2 SRM Lot Number: HPHGAF					
Mercury, Total	98	-	80-120	-	20

Matrix Spike Analysis
Batch Quality Control

Project Name: EVERGREEN WHALE CREEK
Project Number: 10038062

Lab Number: L1701310
Report Date: 02/09/17

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG971760-3 QC Sample: L1701310-03 Client ID: WC-FISH-3												
Aluminum, Total	204.J	2280	2740	120		-	-		75-125	-		20
Antimony, Total	0.283J	9.1	14.9	**164**	Q	-	-		75-125	-		20
Arsenic, Total	2.16J	455	498	109		-	-		75-125	-		20
Barium, Total	5.63	455	521	113		-	-		75-125	-		20
Beryllium, Total	ND	228	246	108		-	-		75-125	-		20
Cadmium, Total	ND	228	247	108		-	-		75-125	-		20
Calcium, Total	62500	2280	76500	**615**	Q	-	-		75-125	-		20
Chromium, Total	1.43	455	497	109		-	-		75-125	-		20
Cobalt, Total	0.259J	455	495	109		-	-		75-125	-		20
Copper, Total	15.2	455	526	112		-	-		75-125	-		20
Iron, Total	440.	2280	3090	116		-	-		75-125	-		20
Lead, Total	0.566	455	521	114		-	-		75-125	-		20
Magnesium, Total	1940	2280	5150	**141**	Q	-	-		75-125	-		20
Manganese, Total	58.8	455	565	111		-	-		75-125	-		20
Nickel, Total	0.523J	455	502	110		-	-		75-125	-		20
Potassium, Total	11700	2280	16800	**224**	Q	-	-		75-125	-		20
Selenium, Total	2.05J	455	481	106		-	-		75-125	-		20
Silver, Total	0.334J	9.1	10.5	115		-	-		75-125	-		20
Sodium, Total	7300	2280	11700	**193**	Q	-	-		75-125	-		20
Thallium, Total	ND	455	521	114		-	-		75-125	-		20
Vanadium, Total	0.690J	455	494	108		-	-		75-125	-		20

Matrix Spike Analysis
Batch Quality Control

Project Name: EVERGREEN WHALE CREEK
Project Number: 10038062

Lab Number: L1701310
Report Date: 02/09/17

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Found	MSD %Recovery	Recovery Limits	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG971760-3 QC Sample: L1701310-03 Client ID: WC-FISH-3									
Zinc, Total	180.	455	714	117	-	-	75-125	-	20
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG971763-3 QC Sample: L1701310-03 Client ID: WC-FISH-3									
Mercury, Total	0.059J	2.87	2.35	82	-	-	80-120	-	20

Lab Duplicate Analysis
Batch Quality Control

Project Name: EVERGREEN WHALE CREEK
Project Number: 10038062

Lab Number: L1701310
Report Date: 02/09/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG971760-4 QC Sample: L1701310-03 Client ID: WC-FISH-3						
Aluminum, Total	204.J	227J	mg/kg	NC		20
Antimony, Total	0.283J	0.201J	mg/kg	NC		20
Arsenic, Total	2.16J	2.70	mg/kg	NC		20
Barium, Total	5.63	6.78	mg/kg	19		20
Beryllium, Total	ND	ND	mg/kg	NC		20
Cadmium, Total	ND	ND	mg/kg	NC		20
Calcium, Total	62500	80100	mg/kg	**25**	Q	20
Chromium, Total	1.43	1.68	mg/kg	16		20
Cobalt, Total	0.259J	0.280J	mg/kg	NC		20
Copper, Total	15.2	18.0	mg/kg	17		20
Iron, Total	440.	524	mg/kg	17		20
Lead, Total	0.566	0.709	mg/kg	**22**	Q	20
Magnesium, Total	1940	2430	mg/kg	**22**	Q	20
Manganese, Total	58.8	74.6	mg/kg	**24**	Q	20
Nickel, Total	0.523J	0.692J	mg/kg	NC		20
Potassium, Total	11700	14200	mg/kg	19		20
Selenium, Total	2.05J	2.47	mg/kg	NC		20
Silver, Total	0.334J	0.425J	mg/kg	NC		20
Sodium, Total	7300	8670	mg/kg	17		20

Lab Duplicate Analysis
Batch Quality Control

Project Name: EVERGREEN WHALE CREEK
Project Number: 10038062

Lab Number: L1701310
Report Date: 02/09/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG971760-4 QC Sample: L1701310-03 Client ID: WC-FISH-3					
Thallium, Total	ND	ND	mg/kg	NC	20
Vanadium, Total	0.690J	0.824J	mg/kg	NC	20
Zinc, Total	180.	220	mg/kg	20	20
Total Metals - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG971763-4 QC Sample: L1701310-03 Client ID: WC-FISH-3					
Mercury, Total	0.059J	0.056J	mg/kg	NC	20

INORGANICS
&
MISCELLANEOUS

Project Name: EVERGREEN WHALE CREEK
Project Number: 10038062
Lab Number: L1701310
Report Date: 02/09/17

SAMPLE RESULTS

Lab ID: L1701310-01
Client ID: WC-FISH-1
Sample Location: OLD BRIDGE, NJ
Matrix: Tissue

Date Collected: 01/13/17 10:30
Date Received: 01/13/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	22.6		%	0.100	0.100	1	-	01/30/17 11:06	121,2540G	SP
Moisture	77.4		%	0.100	0.100	1	-	01/30/17 11:06	121,2540G	SP
Percent Lipids	2.82		%	0.100	NA	1	-	01/23/17 00:00	111,-	TS

Project Name: EVERGREEN WHALE CREEK
Project Number: 10038062
Lab Number: L1701310
Report Date: 02/09/17

SAMPLE RESULTS

Lab ID: L1701310-02
Client ID: WC-FISH-2
Sample Location: OLD BRIDGE, NJ
Matrix: Tissue

Date Collected: 01/13/17 11:00
Date Received: 01/13/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	23.0		%	0.100	0.100	1	-	01/30/17 11:06	121,2540G	SP
Moisture	77.0		%	0.100	0.100	1	-	01/30/17 11:06	121,2540G	SP
Percent Lipids	4.55		%	0.100	NA	1	-	01/23/17 00:00	111,-	TS

Project Name: EVERGREEN WHALE CREEK
Project Number: 10038062
Lab Number: L1701310
Report Date: 02/09/17

SAMPLE RESULTS

Lab ID: L1701310-03
Client ID: WC-FISH-3
Sample Location: OLD BRIDGE, NJ
Matrix: Tissue

Date Collected: 01/13/17 11:20
Date Received: 01/13/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	22.2		%	0.100	0.100	1	-	01/30/17 11:06	121,2540G	SP
Moisture	77.8		%	0.100	0.100	1	-	01/30/17 11:06	121,2540G	SP
Percent Lipids	3.36		%	0.100	NA	1	-	01/23/17 00:00	111,-	TS

Project Name: EVERGREEN WHALE CREEK
Project Number: 10038062
Lab Number: L1701310
Report Date: 02/09/17

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab for sample(s): 01-03 Batch: WG971877-1										
Percent Lipids	ND		%	0.100	NA	1	-	01/23/17 00:00	111,-	TS

Lab Duplicate Analysis
Batch Quality Control

Project Name: EVERGREEN WHALE CREEK
Project Number: 10038062

Lab Number: L1701310
Report Date: 02/09/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG971877-2 QC Sample: L1701310-03 Client ID: WC-FISH-3						
Percent Lipids	3.36	3.39	%	1		20
General Chemistry - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG973668-1 QC Sample: L1701310-01 Client ID: WC-FISH-1						
Solids, Total	22.6	22.7	%	0		10
Moisture	77.4	77.3	%	0		10

Project Name: EVERGREEN WHALE CREEK
Project Number: 10038062

Lab Number: L1701310
Report Date: 02/09/17

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information Custody Seal

Cooler	
A	Absent

Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1701310-01A	Bag	A	N/A	2.0	Y	Absent	A2-TISSUE_PREP(),NJ-RED(),NJDEP()
L1701310-01X	Glass 500ml unpreserved split	A	N/A	2.0	Y	Absent	A2-FE-6020T(180),A2-PB-6020T(180),A2-BA-6020T(180),A2-MOISTURE-2540(7),A2-NI-6020T(180),A2-NJ-PEST-8081(14),A2-SB-6020T(180),A2-ZN-6020T(180),A2-K-6020T(180),A2-LIPIDS(7),A2-CR-6020T(180),A2-TL-6020T(180),A2-TS(7),A2-AS-6020T(180),A2-CO-6020T(180),A2-MN-6020T(180),A2-BE-6020T(180),A2-CD-6020T(180),A2-HG-7474T(365),A2-HGPREP-AF(28),A2-PREP-3051(180),A2-V-6020T(180),A2-MG-6020T(180),A2-SE-6020T(180),A2-AG-6020T(180),A2-AL-6020T(180),A2-CA-6020T(180),A2-CU-6020T(180),A2-NA-6020T(180)
L1701310-01Y	Glass 250ml unpreserved split	A	N/A	2.0	Y	Absent	SUB-PCB-1668(365),SUB-DIOXIN-1613B(365)
L1701310-02A	Bag	A	N/A	2.0	Y	Absent	A2-TISSUE_PREP()

*Values in parentheses indicate holding time in days

Project Name: EVERGREEN WHALE CREEK
Project Number: 10038062

Lab Number: L1701310
Report Date: 02/09/17

Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1701310-02X	Glass 500ml unpreserved split	A	N/A	2.0	Y	Absent	A2-FE-6020T(180),A2-PB-6020T(180),A2-BA-6020T(180),A2-MOISTURE-2540(7),A2-NI-6020T(180),A2-NJ-PEST-8081(14),A2-SB-6020T(180),A2-ZN-6020T(180),A2-K-6020T(180),A2-LIPIDS(7),A2-CR-6020T(180),A2-TL-6020T(180),A2-TS(7),A2-AS-6020T(180),A2-CO-6020T(180),A2-MN-6020T(180),A2-BE-6020T(180),A2-CD-6020T(180),A2-HG-7474T(365),A2-HGPREP-AF(28),A2-PREP-3051(180),A2-V-6020T(180),A2-MG-6020T(180),A2-SE-6020T(180),A2-AG-6020T(180),A2-AL-6020T(180),A2-CA-6020T(180),A2-CU-6020T(180),A2-NA-6020T(180)
L1701310-02Y	Glass 250ml unpreserved split	A	N/A	2.0	Y	Absent	SUB-PCB-1668(365),SUB-DIOXIN-1613B(365)
L1701310-03A	Bag	A	N/A	2.0	Y	Absent	A2-TISSUE_PREP()
L1701310-03X	Glass 500ml unpreserved split	A	N/A	2.0	Y	Absent	A2-FE-6020T(180),A2-PB-6020T(180),A2-BA-6020T(180),A2-MOISTURE-2540(7),A2-NI-6020T(180),A2-NJ-PEST-8081(14),A2-SB-6020T(180),A2-ZN-6020T(180),A2-K-6020T(180),A2-LIPIDS(7),A2-CR-6020T(180),A2-TL-6020T(180),A2-TS(7),A2-AS-6020T(180),A2-CO-6020T(180),A2-MN-6020T(180),A2-BE-6020T(180),A2-CD-6020T(180),A2-HG-7474T(365),A2-HGPREP-AF(28),A2-PREP-3051(180),A2-V-6020T(180),A2-MG-6020T(180),A2-SE-6020T(180),A2-AG-6020T(180),A2-AL-6020T(180),A2-CA-6020T(180),A2-CU-6020T(180),A2-NA-6020T(180)
L1701310-03Y	Glass 250ml unpreserved split	A	N/A	2.0	Y	Absent	SUB-PCB-1668(365),SUB-DIOXIN-1613B(365)
L1701310-04A	Bag	A	N/A	2.0	Y	Absent	-
L1701310-07A	Bag	A	N/A	2.0	Y	Absent	-

*Values in parentheses indicate holding time in days

Project Name:	EVERGREEN WHALE CREEK	**Lab Number:**	L1701310
Project Number:	10038062	**Report Date:**	02/09/17

GLOSSARY

Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

1	- The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Data Qualifiers

A	- Spectra identified as "Aldol Condensation Product".
B	- The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the

Report Format: DU Report with 'J' Qualifiers

Project Name:	EVERGREEN WHALE CREEK	**Lab Number:**	L1701310
Project Number:	10038062	**Report Date:**	02/09/17

Data Qualifiers

reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

J - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

ND - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

Report Format: DU Report with 'J' Qualifiers

Project Name:	EVERGREEN WHALE CREEK	**Lab Number:**	L1701310
Project Number:	10038062	**Report Date:**	02/09/17

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

111 NOAA Technical Memorandum NOS ORCA 130: Sampling and Analytical Methods of the National Status and Trends Program Mussel Watch Project: 1993-196 Update. March 1998.

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
EPA 300: DW: Bromide
EPA 6860: NPW and SCM: Perchlorate
EPA 9010: NPW and SCM: Amenable Cyanide Distillation
EPA 9012B: NPW: Total Cyanide
EPA 9050A: NPW: Specific Conductance
SM3500: NPW: Ferrous Iron
SM4500: NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO2, NO3.
SM5310C: DW: Dissolved Organic Carbon

Mansfield Facility
SM 2540D: TSS
EPA 3005A NPW
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **SM4500NO3-F, EPA 353.2**: Nitrate-N**, EPA 351.1, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D.**
EPA 624: Volatile Halocarbons & Aromatics,
EPA 608: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E.**

Mansfield Facility:

Drinking Water
EPA 200.7: Ba, Be, Cd, Cr, Cu, Ni, Na, Ca. **EPA 200.8:** Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Ni, Se, TL. **EPA 245.1** Hg.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

Serial_No:02091710:02

NEW YORK CHAIN OF CUSTODY

ALPHA ANALYTICAL

Westborough, MA 01581
8 Walkup Dr.
TEL: 508-898-9220
FAX: 508-898-9193

Mansfield, MA 02048
320 Forbes Blvd
TEL: 508-822-9300
FAX: 508-822-3288

Service Centers
Mahwah, NJ 07430: 35 Whitney Rd, Suite 5
Albany, NY 12205: 14 Walker Way
Tonawanda, NY 14150: 275 Cooper Ave, Suite 105

Page 1 of 1

Date Rec'd in Lab 1/4/17

ALPHA Job # L1701310

Project Information
Project Name: Evergreen/Whale Creek
Project Location: Old Bridge, NJ
Project # 10038062
(Use Project name as Project #) ☐
Project Manager: David Brizzolara
ALPHAQuote #:

Turn-Around Time
Standard ☐ Due Date:
Rush (only if pre approved) ☐ # of Days:

Client Information
Client: HDR Engineering Inc
Address: 1 International Blvd 10th Floor Suite 1000 Mahwah, NJ 07495
Phone: (201) 335-9341
Fax: (201) 335-9301
Email: david.brizzolara@hdrinc.com

Deliverables
☐ ASP-A ☐ ASP-B
☐ EQuIS (1 File) ☐ EQuIS (4 File)
☐ Other Call PM-PDF

Billing Information
☑ Same as Client Info
PO # 1000100012511

Regulatory Requirement
☐ NY TOGS ☐ NY Part 375
☐ AWQ Standards ☐ NY CP-51
☐ NY Restricted Use ☐ Other
☐ NY Unrestricted Use
☐ NYC Sewer Discharge
Call PM

Disposal Site Information
Please identify below location of applicable disposal facilities.
Disposal Facility:
☐ NJ ☐ NY
☐ Other:

These samples have been previously analyzed by Alpha ☐

Other project specific requirements/comments:

Please specify Metals or TAL.

Sample Filtration
☐ Done
☐ Lab to do
Preservation
☐ Lab to do
(Please Specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	PCB Congeners (EPA 1668)	Dioxin/Furan (EPA 1613)	TAL Metals (SW 846 6020/7471)	Pesticides (SW 846 8081)	% Moisture (SM2540B)	Lipids	Homogenization		Sample Specific Comments	Total Bottles
01310.01,02,03	WC-FISH-1	1/13/17	10:30	Fish tissue	DB, DY	X	X	X	X	X	X	X			
.04,05,06	WC-FISH-2	1/13/17	11:00	↓	DB, DY	↓	↓	↓	↓	↓	↓	↓			
.07,08,09	WC-FISH-3	1/13/17	11:20	↓	DB, DY	↓	↓	↓	↓	↓	↓	↓			

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

Container Code
P = Plastic
A = Amber Glass
V = Vial
G = Glass
B = Bacteria Cup
C = Cube
O = Other
E = Encore
D = BOD Bottle

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Container Type
Preservative

Relinquished By:	Date/Time	Received By:	Date/Time
David Brizzolara	1/13/17 13:03	Sean Hogakhole AAL	1/13/17 13:03
Sean Hogakhole	1/13/17 13:05	D. Vlachos	1-13-17 2136
D. Vlachos	1-14-17 0245	[illegible]	1/14/17 02:45

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. BY EXECUTING THIS COC, THE CLIENT HAS READ AND AGREES TO BE BOUND BY ALPHA'S TERMS & CONDITIONS. (See reverse side.)

Form No: 01-25 HC (rev. 30-Sept-2013)

PCB Congener and Dioxin/Furan Laboratory Analysis

CFA | Cape Fear Analytical LLC
an affiliate of The GEL Group INC

3306 Kitty Hawk Road, Suite 120 Wilmington, NC 28405
P 910.795.0421
www.capefearanalytical.com

March 07, 2017

Ms. Elizabeth Porta
Alpha Analytical Laboratory
8 Walkup Drive
Westborough, Massachusetts 01581

Re: Dioxin and PCB Subcontract, Liz Porta PM
Work Order: 10446
SDG: L1701310

Dear Ms. Porta:

Cape Fear Analytical LLC (CFA) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on February 11, 2017. This original data report has been prepared and reviewed in accordance with CFA's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at 910-795-0421.

Sincerely,

Cynde Larkins

Cynde Larkins
Project Manager

Enclosures

SUB UPS: CAPE FEAR, NC

CFA WO#10446

CHAIN OF CUSTODY

PAGE OF

ALPHA ANALYTICAL

Westborough, MA TEL: 508-898-9220 FAX: 508-898-9193
Mansfield, MA TEL: 508-822-9300 FAX: 508-822-3288

Date Rec'd in Lab:

ALPHA Job #: L1701310

Project Information

Project Name:

Project Location: NJ

Project #:

Project Manager: Elizabeth Porta

ALPHA Quote #:

Client Information

Client: Alpha Analytical Lab

Address: 320 Forbes Blvd.

Mansfield, Ma 02048

Phone: 508-822-9300

Fax:

Email: subreports@alphalab.com,eporta@alphalab.com

☐ These samples have been Previously analyzed by Alpha

Turn-Around Time

☒ Standard ☐ Rush (ONLY IF PRE-APPROVED)

Due Date: Time:

Report Information Data Deliverables

☐ FAX ☒ EMAIL

☐ ADEx ☐ Add'l Deliverables

Billing Information

☐ Same as Client info PO #:

Regulatory Requirements/Report Limits

State/Fed Program | Criteria

MCP PRESUMPTIVE CERTAINTY-CT REASONABLE CONFIDENCE PROTOCOLS

☐ Yes ☒ No Are MCP Analytical Methods Required?

☐ Yes ☒ No Are CT RCP (Reasonable Confidence Protocols) Required?

Other Project Specific Requirements/Comments/Detection Limits:

Please include Alpha job #L1701310 on this report. Samples homogenized and stored frozen 1/19/17.

ANALYSIS

SAMPLE HANDLING
Filtration
☐ Done
☐ Not Needed
☐ Lab to do
Preservation
☐ Lab to do
(Please specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Dioxin/ Furan 1631B	PCB via 1668C	Sample Specific Comments	TOTAL # BOTTLES
	WC-FISH-1	01/13/17	10:30	Tissue		☒	☒	L1701310-01	1
	WC-FISH-2	01/13/17	11:00	Tissue		☒	☒	L1701310-02	1
	WC-FISH-3	01/13/17	11:20	Tissue		☒	☒	L1701310-03	1
Container Type						A	A		
Preservative						A	A		

PLEASE ANSWER QUESTIONS ABOVE!

IS YOUR PROJECT MA MCP or CT RCP?

FORM NO: 01-01(I) (rev. 30-JUL-07)

Relinquished By:	Date/Time	Received By:	Date/Time
[signature] -AAL	2/9/17 1700	UPS	
		[signature] -CFA	11Feb17 0949

Seal intact
4.0+.1=4.1°C

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Payment Terms.

SAMPLE RECEIPT CHECKLIST

Cape Fear Analytical

Client: ALPH	Work Order: 10446
Shipping Company: UPS	Date/Time Received: 11 Feb 2017 9:49

Suspected Hazard Information	Yes	NA	No
Shipped as DOT Hazardous?			—
Samples identified as Foreign Soil?			—

DOE Site Sample Packages	Yes	NA	No*
Screened <0.5 mR/hr?		—	
Samples < 2x background?		~	

* Notify RSO of any responses in this column immediately.

Air Sample Receipt Specifics	Yes	NA	No
Air sample in shipment?			—

Air Witness: _____

	Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	✓			Circle Applicable: seals broken damaged container leaking container other(describe)
2	Chain of Custody documents included with shipment?	✓			
3	Samples requiring cold preservation within 0-6°C?	✓			Preservation Method: (ice bags) blue ice dry ice none other (describe) 4.0+0.1=4.1°C
4	Aqueous samples found to have visible solids?		✓		Sample IDs, containers affected:
5	Samples requiring chemical preservation at proper pH?		✓		Sample IDs, containers affected and pH observed: If preservative added, Lot#:
6	Samples requiring preservation have no residual chlorine?		✓		Sample IDs, containers affected: If preservative added, Lot#:
7	Samples received within holding time?	✓			Sample IDs, tests affected:
8	Sample IDs on COC match IDs on containers?	✓			Sample IDs, containers affected:
9	Date & time of COC match date & time on containers?	✓			Sample IDs, containers affected:
10	Number of containers received match number indicated on COC?	✓			List type and number of containers / Sample IDs, containers affected: 1-8oz amber each
11	COC form is properly signed in relinquished/received sections?	✓			

Comments:

Checklist performed by: Initials: MSO Date: 13 Feb 2017

CF-UD-F-7

High Resolution Dioxins and Furans Analysis

Case Narrative

HDOX Case Narrative
Alpha Analytical Laboratory (ALPH)
SDG L1701310
Work Order 10446

Method/Analysis Information

Product:	**Dioxins/Furans by EPA Method 1613B in Tissues**
Analytical Method:	EPA Method 1613B
Extraction Method:	SW846 3540C
Analytical Batch Number:	34092
Clean Up Batch Number:	34091
Extraction Batch Number:	34090

Sample Analysis

The following samples were analyzed using the analytical protocol as established in EPA Method 1613B:

Sample ID	Client ID
10446001	WC-FISH-1
10446002	WC-FISH-2
10446003	WC-FISH-3
12018124	Method Blank (MB)
12018125	Laboratory Control Sample (LCS)
12018126	Laboratory Control Sample Duplicate (LCSD)
12018127	10446003(WC-FISH-3) Matrix Spike (MS)
12018128	10446003(WC-FISH-3) Matrix Spike Duplicate (MSD)

The samples in this SDG were analyzed on an "as received" basis.

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by Cape Fear Analytical LLC (CFA) as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with CF-OA-E-002 REV# 14.

Raw data reports are processed and reviewed by the analyst using the TargetLynx software package.

Calibration Information

Initial Calibration

All initial calibration requirements have been met for this sample delivery group (SDG).

Continuing Calibration Verification (CCV) Requirements
All associated calibration verification standard(s) (CCV) met the acceptance criteria.

Quality Control (QC) Information

Certification Statement
The test results presented in this document are certified to meet all requirements of the 2009 TNI Standard.

Method Blank (MB) Statement
The MB(s) analyzed with this SDG met the acceptance criteria.

Surrogate Recoveries
All surrogate recoveries were within the established acceptance criteria for this SDG.

Laboratory Control Sample (LCS) Recovery
The LCS spike recoveries met the acceptance limits.

Laboratory Control Sample Duplicate (LCSD) Recovery
The LCSD spike recoveries met the acceptance limits.

LCS/LCSD Relative Percent Difference (RPD) Statement
The RPD(s) between the LCS and LCSD met the acceptance limits.

QC Sample Designation
Sample 10446003 (WC-FISH-3) was selected for analysis as the matrix spike and matrix spike duplicate.

Matrix Spike (MS) Recovery Statement
The MS recoveries were within the established acceptance limits.

Matrix Spike Duplicate (MSD) Recovery Statement
The MSD recoveries were within the established acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement
The RPD(s) between the MS and MSD met the acceptance limits.

Technical Information

Holding Time Specifications
CFA assigns holding times based on the associated methodology, which assigns the date and time from sample collection. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

Preparation/Analytical Method Verification
All procedures were performed as stated in the SOP.

Sample Dilutions
The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis
Re-extractions or re-analyses were not required in this SDG.

Miscellaneous Information

Nonconformance (NCR) Documentation
A NCR was not required for this SDG.

Manual Integrations
Certain standards and QC samples required manual integrations to correctly position the baseline as set in the calibration standard injections. Where manual integrations were performed, copies of all manual integration peak profiles are included in the raw data section of this fraction. Manual integrations were required for data files in this SDG.

System Configuration
This analysis was performed on the following instrument configuration:

Instrument ID	Instrument	System Configuration	Column ID	Column Description
HRP791_3	Primary Dioxin Analysis	Dioxin Analysis	DB-5MS	60m x 0.25mm, 0.25um

Electronic Packaging Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted: Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative will include the data validator's signature and title. The signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Sample Data Summary

Cape Fear Analytical, LLC

3306 Kitty Hawk Road Suite 120, Wilmington, NC 28405 - (910) 795-0421 - www.capefearanalytical.com

Certificate of Analysis Report
for

ALPH001 Alpha Analytical Laboratory

Client SDG: L1701310 CFA Work Order: 10446

The Qualifiers in this report are defined as follows:

* A quality control analyte recovery is outside of specified acceptance criteria

** Analyte is a surrogate compound

U Analyte was analyzed for, but not detected above the specified detection limit.

Review/Validation

Cape Fear Analytical requires all analytical data to be verified by a qualified data reviewer.

The following data validator verified the information presented in this case narrative:

Signature:  **Name: Heather Patterson**

Date: 07 MAR 2017 **Title: Group Leader**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446001**	**Date Collected:**	**01/13/2017 10:30**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-1**			**Prep Basis:**	**As Received**
Batch ID:	**34092**	**Method:**	**EPA Method 1613B**		
Run Date:	**02/25/2017 16:42**	**Analyst:**	**MJC**	**Instrument:**	**HRP791**
Data File:	**c25feb17a-10**			**Dilution:**	**1**
Prep Batch:	**34090**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**23-FEB-17**	**Prep Aliquot:**	**10.59 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
1746-01-6	2,3,7,8-TCDD	U	0.944	pg/g	0.944
40321-76-4	1,2,3,7,8-PeCDD	U	4.72	pg/g	4.72
39227-28-6	1,2,3,4,7,8-HxCDD	U	4.72	pg/g	4.72
57653-85-7	1,2,3,6,7,8-HxCDD	U	4.72	pg/g	4.72
19408-74-3	1,2,3,7,8,9-HxCDD	U	4.72	pg/g	4.72
35822-46-9	1,2,3,4,6,7,8-HpCDD	U	4.72	pg/g	4.72
3268-87-9	1,2,3,4,6,7,8,9-OCDD	U	9.44	pg/g	9.44
51207-31-9	2,3,7,8-TCDF	U	0.944	pg/g	0.944
57117-41-6	1,2,3,7,8-PeCDF	U	4.72	pg/g	4.72
57117-31-4	2,3,4,7,8-PeCDF	U	4.72	pg/g	4.72
70648-26-9	1,2,3,4,7,8-HxCDF	U	4.72	pg/g	4.72
57117-44-9	1,2,3,6,7,8-HxCDF	U	4.72	pg/g	4.72
60851-34-5	2,3,4,6,7,8-HxCDF	U	4.72	pg/g	4.72
72918-21-9	1,2,3,7,8,9-HxCDF	U	4.72	pg/g	4.72
67562-39-4	1,2,3,4,6,7,8-HpCDF	U	4.72	pg/g	4.72
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	4.72	pg/g	4.72
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	9.44	pg/g	9.44
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	U	0.944	pg/g	0.944
36088-22-9	Total Pentachlorodibenzo-p-dioxin	U	4.72	pg/g	4.72
34465-46-8	Total Hexachlorodibenzo-p-dioxin	U	4.72	pg/g	4.72
37871-00-4	Total Heptachlorodibenzo-p-dioxin	U	4.72	pg/g	4.72
30402-14-3	Total Tetrachlorodibenzofuran	U	0.944	pg/g	0.944
30402-15-4	Total Pentachlorodibenzofuran	U	4.72	pg/g	4.72
55684-94-1	Total Hexachlorodibenzofuran	U	4.72	pg/g	4.72
38998-75-3	Total Heptachlorodibenzofuran	U	4.72	pg/g	4.72
3333-30-0	TEQ WHO2005 ND=0		0.00	pg/g	
3333-30-1	TEQ WHO2005 ND=0.5		5.39	pg/g	

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		165	189	pg/g	87.2	(25%-164%)
13C-1,2,3,7,8-PeCDD		163	189	pg/g	86.2	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		154	189	pg/g	81.5	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		157	189	pg/g	83.2	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		154	189	pg/g	81.4	(23%-140%)
13C-OCDD		265	378	pg/g	70.1	(17%-157%)
13C-2,3,7,8-TCDF		146	189	pg/g	77.1	(24%-169%)
13C-1,2,3,7,8-PeCDF		147	189	pg/g	78.0	(24%-185%)
13C-2,3,4,7,8-PeCDF		145	189	pg/g	77.0	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		139	189	pg/g	73.7	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		135	189	pg/g	71.7	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		139	189	pg/g	73.5	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		145	189	pg/g	76.9	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446001**	**Date Collected:**	**01/13/2017 10:30**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-1**			**Prep Basis:**	**As Received**
Batch ID:	**34092**	**Method:**	**EPA Method 1613B**		
Run Date:	**02/25/2017 16:42**	**Analyst:**	**MJC**	**Instrument:**	**HRP791**
Data File:	**c25feb17a-10**			**Dilution:**	**1**
Prep Batch:	**34090**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**23-FEB-17**	**Prep Aliquot:**	**10.59 g**		

CAS No.	Parmname	Qual	Result	Units	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		132	189	pg/g	70.0	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		139	189	pg/g	73.8	(26%-138%)
37Cl-2,3,7,8-TCDD		15.8	18.9	pg/g	83.8	(35%-197%)

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446002**	**Date Collected:**	**01/13/2017 11:00**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-2**			**Prep Basis:**	**As Received**
Batch ID:	**34092**	**Method:**	**EPA Method 1613B**		
Run Date:	**02/25/2017 17:31**	**Analyst:**	**MJC**	**Instrument:**	**HRP791**
Data File:	**c25feb17a-11**			**Dilution:**	**1**
Prep Batch:	**34090**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**23-FEB-17**	**Prep Aliquot:**	**10.02 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
1746-01-6	2,3,7,8-TCDD	U	0.998	pg/g	0.998
40321-76-4	1,2,3,7,8-PeCDD	U	4.99	pg/g	4.99
39227-28-6	1,2,3,4,7,8-HxCDD	U	4.99	pg/g	4.99
57653-85-7	1,2,3,6,7,8-HxCDD	U	4.99	pg/g	4.99
19408-74-3	1,2,3,7,8,9-HxCDD	U	4.99	pg/g	4.99
35822-46-9	1,2,3,4,6,7,8-HpCDD	U	4.99	pg/g	4.99
3268-87-9	1,2,3,4,6,7,8,9-OCDD	U	9.98	pg/g	9.98
51207-31-9	2,3,7,8-TCDF	U	0.998	pg/g	0.998
57117-41-6	1,2,3,7,8-PeCDF	U	4.99	pg/g	4.99
57117-31-4	2,3,4,7,8-PeCDF	U	4.99	pg/g	4.99
70648-26-9	1,2,3,4,7,8-HxCDF	U	4.99	pg/g	4.99
57117-44-9	1,2,3,6,7,8-HxCDF	U	4.99	pg/g	4.99
60851-34-5	2,3,4,6,7,8-HxCDF	U	4.99	pg/g	4.99
72918-21-9	1,2,3,7,8,9-HxCDF	U	4.99	pg/g	4.99
67562-39-4	1,2,3,4,6,7,8-HpCDF	U	4.99	pg/g	4.99
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	4.99	pg/g	4.99
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	9.98	pg/g	9.98
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	U	0.998	pg/g	0.998
36088-22-9	Total Pentachlorodibenzo-p-dioxin	U	4.99	pg/g	4.99
34465-46-8	Total Hexachlorodibenzo-p-dioxin	U	4.99	pg/g	4.99
37871-00-4	Total Heptachlorodibenzo-p-dioxin	U	4.99	pg/g	4.99
30402-14-3	Total Tetrachlorodibenzofuran	U	0.998	pg/g	0.998
30402-15-4	Total Pentachlorodibenzofuran	U	4.99	pg/g	4.99
55684-94-1	Total Hexachlorodibenzofuran	U	4.99	pg/g	4.99
38998-75-3	Total Heptachlorodibenzofuran	U	4.99	pg/g	4.99
3333-30-0	TEQ WHO2005 ND=0		0.00	pg/g	
3333-30-1	TEQ WHO2005 ND=0.5		5.69	pg/g	

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		180	200	pg/g	90.3	(25%-164%)
13C-1,2,3,7,8-PeCDD		179	200	pg/g	89.5	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		168	200	pg/g	84.1	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		178	200	pg/g	89.2	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		171	200	pg/g	85.6	(23%-140%)
13C-OCDD		306	399	pg/g	76.7	(17%-157%)
13C-2,3,7,8-TCDF		158	200	pg/g	79.0	(24%-169%)
13C-1,2,3,7,8-PeCDF		163	200	pg/g	81.8	(24%-185%)
13C-2,3,4,7,8-PeCDF		162	200	pg/g	81.1	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		155	200	pg/g	77.7	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		150	200	pg/g	75.3	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		156	200	pg/g	78.0	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		166	200	pg/g	83.2	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446002**	**Date Collected:**	**01/13/2017 11:00**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-2**			**Prep Basis:**	**As Received**
Batch ID:	**34092**	**Method:**	**EPA Method 1613B**		
Run Date:	**02/25/2017 17:31**	**Analyst:**	**MJC**	**Instrument:**	**HRP791**
Data File:	**c25feb17a-11**			**Dilution:**	**1**
Prep Batch:	**34090**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**23-FEB-17**	**Prep Aliquot:**	**10.02 g**		

CAS No.	Parmname	Qual	Result	Units	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		155	200	pg/g	77.5	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		157	200	pg/g	78.6	(26%-138%)
37Cl-2,3,7,8-TCDD		16.8	20.0	pg/g	84.0	(35%-197%)

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446003**	**Date Collected:**	**01/13/2017 11:20**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-3**			**Prep Basis:**	**As Received**
Batch ID:	**34092**	**Method:**	**EPA Method 1613B**		
Run Date:	**02/25/2017 18:19**	**Analyst:**	**MJC**	**Instrument:**	**HRP791**
Data File:	**c25feb17a-12**			**Dilution:**	**1**
Prep Batch:	**34090**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**23-FEB-17**	**Prep Aliquot:**	**10.12 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
1746-01-6	2,3,7,8-TCDD	U	0.988	pg/g	0.988
40321-76-4	1,2,3,7,8-PeCDD	U	4.94	pg/g	4.94
39227-28-6	1,2,3,4,7,8-HxCDD	U	4.94	pg/g	4.94
57653-85-7	1,2,3,6,7,8-HxCDD	U	4.94	pg/g	4.94
19408-74-3	1,2,3,7,8,9-HxCDD	U	4.94	pg/g	4.94
35822-46-9	1,2,3,4,6,7,8-HpCDD	U	4.94	pg/g	4.94
3268-87-9	1,2,3,4,6,7,8,9-OCDD	U	9.88	pg/g	9.88
51207-31-9	2,3,7,8-TCDF	U	0.988	pg/g	0.988
57117-41-6	1,2,3,7,8-PeCDF	U	4.94	pg/g	4.94
57117-31-4	2,3,4,7,8-PeCDF	U	4.94	pg/g	4.94
70648-26-9	1,2,3,4,7,8-HxCDF	U	4.94	pg/g	4.94
57117-44-9	1,2,3,6,7,8-HxCDF	U	4.94	pg/g	4.94
60851-34-5	2,3,4,6,7,8-HxCDF	U	4.94	pg/g	4.94
72918-21-9	1,2,3,7,8,9-HxCDF	U	4.94	pg/g	4.94
67562-39-4	1,2,3,4,6,7,8-HpCDF	U	4.94	pg/g	4.94
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	4.94	pg/g	4.94
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	9.88	pg/g	9.88
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	U	0.988	pg/g	0.988
36088-22-9	Total Pentachlorodibenzo-p-dioxin	U	4.94	pg/g	4.94
34465-46-8	Total Hexachlorodibenzo-p-dioxin	U	4.94	pg/g	4.94
37871-00-4	Total Heptachlorodibenzo-p-dioxin	U	4.94	pg/g	4.94
30402-14-3	Total Tetrachlorodibenzofuran	U	0.988	pg/g	0.988
30402-15-4	Total Pentachlorodibenzofuran	U	4.94	pg/g	4.94
55684-94-1	Total Hexachlorodibenzofuran	U	4.94	pg/g	4.94
38998-75-3	Total Heptachlorodibenzofuran	U	4.94	pg/g	4.94
3333-30-0	TEQ WHO2005 ND=0		0.00	pg/g	
3333-30-1	TEQ WHO2005 ND=0.5		5.64	pg/g	

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		175	198	pg/g	88.4	(25%-164%)
13C-1,2,3,7,8-PeCDD		175	198	pg/g	88.5	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		173	198	pg/g	87.8	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		173	198	pg/g	87.4	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		167	198	pg/g	84.7	(23%-140%)
13C-OCDD		293	395	pg/g	74.2	(17%-157%)
13C-2,3,7,8-TCDF		155	198	pg/g	78.6	(24%-169%)
13C-1,2,3,7,8-PeCDF		159	198	pg/g	80.7	(24%-185%)
13C-2,3,4,7,8-PeCDF		158	198	pg/g	80.1	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		155	198	pg/g	78.6	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		153	198	pg/g	77.2	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		153	198	pg/g	77.7	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		167	198	pg/g	84.7	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446003**	**Date Collected:**	**01/13/2017 11:20**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-3**			**Prep Basis:**	**As Received**
Batch ID:	**34092**	**Method:**	**EPA Method 1613B**		
Run Date:	**02/25/2017 18:19**	**Analyst:**	**MJC**	**Instrument:**	**HRP791**
Data File:	**c25feb17a-12**			**Dilution:**	**1**
Prep Batch:	**34090**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**23-FEB-17**	**Prep Aliquot:**	**10.12 g**		

CAS No.	Parmname	Qual	Result	Units	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		146	198	pg/g	73.9	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		153	198	pg/g	77.5	(26%-138%)
37Cl-2,3,7,8-TCDD		17.0	19.8	pg/g	85.9	(35%-197%)

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.

Quality Control Summary

Hi-Res Dioxins/Furans

Surrogate Recovery Report

SDG Number: L1701310

Matrix Type: TISSUE

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
12018125	LCS for batch 34090	13C-2,3,7,8-TCDD		93.8	(20%-175%)
		13C-1,2,3,7,8-PeCDD		90.7	(21%-227%)
		13C-1,2,3,4,7,8-HxCDD		81.4	(21%-193%)
		13C-1,2,3,6,7,8-HxCDD		96.6	(25%-163%)
		13C-1,2,3,4,6,7,8-HpCDD		82.3	(22%-166%)
		13C-OCDD		72.7	(13%-199%)
		13C-2,3,7,8-TCDF		81.9	(22%-152%)
		13C-1,2,3,7,8-PeCDF		82.9	(21%-192%)
		13C-2,3,4,7,8-PeCDF		83.7	(13%-328%)
		13C-1,2,3,4,7,8-HxCDF		76.0	(19%-202%)
		13C-1,2,3,6,7,8-HxCDF		84.7	(21%-159%)
		13C-2,3,4,6,7,8-HxCDF		84.9	(22%-176%)
		13C-1,2,3,7,8,9-HxCDF		81.0	(17%-205%)
		13C-1,2,3,4,6,7,8-HpCDF		76.1	(21%-158%)
		13C-1,2,3,4,7,8,9-HpCDF		75.7	(20%-186%)
		37Cl-2,3,7,8-TCDD		84.3	(31%-191%)
12018126	LCSD for batch 34090	13C-2,3,7,8-TCDD		94.3	(20%-175%)
		13C-1,2,3,7,8-PeCDD		93.3	(21%-227%)
		13C-1,2,3,4,7,8-HxCDD		85.0	(21%-193%)
		13C-1,2,3,6,7,8-HxCDD		92.5	(25%-163%)
		13C-1,2,3,4,6,7,8-HpCDD		84.7	(22%-166%)
		13C-OCDD		71.7	(13%-199%)
		13C-2,3,7,8-TCDF		82.1	(22%-152%)
		13C-1,2,3,7,8-PeCDF		83.2	(21%-192%)
		13C-2,3,4,7,8-PeCDF		86.5	(13%-328%)
		13C-1,2,3,4,7,8-HxCDF		79.3	(19%-202%)
		13C-1,2,3,6,7,8-HxCDF		78.5	(21%-159%)
		13C-2,3,4,6,7,8-HxCDF		81.7	(22%-176%)
		13C-1,2,3,7,8,9-HxCDF		82.5	(17%-205%)
		13C-1,2,3,4,6,7,8-HpCDF		76.7	(21%-158%)
		13C-1,2,3,4,7,8,9-HpCDF		76.0	(20%-186%)
		37Cl-2,3,7,8-TCDD		90.3	(31%-191%)
12018124	MB for batch 34090	13C-2,3,7,8-TCDD		96.5	(25%-164%)
		13C-1,2,3,7,8-PeCDD		94.2	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		88.3	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		95.8	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		88.5	(23%-140%)
		13C-OCDD		77.6	(17%-157%)
		13C-2,3,7,8-TCDF		83.5	(24%-169%)
		13C-1,2,3,7,8-PeCDF		86.3	(24%-185%)
		13C-2,3,4,7,8-PeCDF		86.5	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		82.7	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		81.1	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		85.6	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		88.6	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		78.2	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		78.9	(26%-138%)
		37Cl-2,3,7,8-TCDD		89.4	(35%-197%)
10446001	WC-FISH-1	13C-2,3,7,8-TCDD		87.2	(25%-164%)

Surrogate Recovery Report

SDG Number: L1701310

Matrix Type: TISSUE

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
10446001	WC-FISH-1	13C-1,2,3,7,8-PeCDD		86.2	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		81.5	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		83.2	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		81.4	(23%-140%)
		13C-OCDD		70.1	(17%-157%)
		13C-2,3,7,8-TCDF		77.1	(24%-169%)
		13C-1,2,3,7,8-PeCDF		78.0	(24%-185%)
		13C-2,3,4,7,8-PeCDF		77.0	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		73.7	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		71.7	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		73.5	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		76.9	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		70.0	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		73.8	(26%-138%)
		37Cl-2,3,7,8-TCDD		83.8	(35%-197%)
10446002	WC-FISH-2	13C-2,3,7,8-TCDD		90.3	(25%-164%)
		13C-1,2,3,7,8-PeCDD		89.5	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		84.1	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		89.2	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		85.6	(23%-140%)
		13C-OCDD		76.7	(17%-157%)
		13C-2,3,7,8-TCDF		79.0	(24%-169%)
		13C-1,2,3,7,8-PeCDF		81.8	(24%-185%)
		13C-2,3,4,7,8-PeCDF		81.1	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		77.7	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		75.3	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		78.0	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		83.2	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		77.5	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		78.6	(26%-138%)
		37Cl-2,3,7,8-TCDD		84.0	(35%-197%)
10446003	WC-FISH-3	13C-2,3,7,8-TCDD		88.4	(25%-164%)
		13C-1,2,3,7,8-PeCDD		88.5	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		87.8	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		87.4	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		84.7	(23%-140%)
		13C-OCDD		74.2	(17%-157%)
		13C-2,3,7,8-TCDF		78.6	(24%-169%)
		13C-1,2,3,7,8-PeCDF		80.7	(24%-185%)
		13C-2,3,4,7,8-PeCDF		80.1	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		78.6	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		77.2	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		77.7	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		84.7	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		73.9	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		77.5	(26%-138%)
		37Cl-2,3,7,8-TCDD		85.9	(35%-197%)
12018127	WC-FISH-3(10446003MS)	13C-2,3,7,8-TCDD		93.4	(25%-164%)
		13C-1,2,3,7,8-PeCDD		94.7	(25%-181%)

Hi-Res Dioxins/Furans
Surrogate Recovery Report

SDG Number: L1701310

Matrix Type: TISSUE

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
12018127	WC-FISH-3(10446003MS)	13C-1,2,3,4,7,8-HxCDD		94.6	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		88.5	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		89.2	(23%-140%)
		13C-OCDD		79.9	(17%-157%)
		13C-2,3,7,8-TCDF		80.7	(24%-169%)
		13C-1,2,3,7,8-PeCDF		83.0	(24%-185%)
		13C-2,3,4,7,8-PeCDF		85.4	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		82.8	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		78.8	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		82.0	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		85.9	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		79.5	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		83.2	(26%-138%)
		37Cl-2,3,7,8-TCDD		88.6	(35%-197%)
12018128	WC-FISH-3(10446003MSD)	13C-2,3,7,8-TCDD		90.0	(25%-164%)
		13C-1,2,3,7,8-PeCDD		93.6	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		81.8	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		86.4	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		82.0	(23%-140%)
		13C-OCDD		73.2	(17%-157%)
		13C-2,3,7,8-TCDF		79.3	(24%-169%)
		13C-1,2,3,7,8-PeCDF		83.2	(24%-185%)
		13C-2,3,4,7,8-PeCDF		83.9	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		75.6	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		73.4	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		77.0	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		80.3	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		72.1	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		75.9	(26%-138%)
		37Cl-2,3,7,8-TCDD		84.6	(35%-197%)

* Recovery outside Acceptance Limits
# Column to be used to flag recovery values
D Sample Diluted

Hi-Res Dioxins/Furans

Quality Control Summary
Spike Recovery Report

SDG Number: L1701310 **Sample Type:** Laboratory Control Sample

Client ID: LCS for batch 34090 **Matrix:** TISSUE

Lab Sample ID: 12018125

Instrument: HRP791 **Analysis Date:** 02/25/2017 13:29 **Dilution:** 1

Analyst: MJC **Prep Batch ID:** 34090

Batch ID: 34092

CAS No.		Parmname	Amount Added pg/g	Spike Conc. pg/g	Recovery %	Acceptance Limits
1746-01-6	LCS	2,3,7,8-TCDD	20.0	19.2	95.8	67-158
40321-76-4	LCS	1,2,3,7,8-PeCDD	100	97.5	97.5	70-142
39227-28-6	LCS	1,2,3,4,7,8-HxCDD	100	98.6	98.6	70-164
57653-85-7	LCS	1,2,3,6,7,8-HxCDD	100	102	102	76-134
19408-74-3	LCS	1,2,3,7,8,9-HxCDD	100	108	108	64-162
35822-46-9	LCS	1,2,3,4,6,7,8-HpCDD	100	101	101	70-140
3268-87-9	LCS	1,2,3,4,6,7,8,9-OCDD	200	203	102	78-144
51207-31-9	LCS	2,3,7,8-TCDF	20.0	19.1	95.7	75-158
57117-41-6	LCS	1,2,3,7,8-PeCDF	100	96.3	96.3	80-134
57117-31-4	LCS	2,3,4,7,8-PeCDF	100	103	103	68-160
70648-26-9	LCS	1,2,3,4,7,8-HxCDF	100	98.3	98.3	72-134
57117-44-9	LCS	1,2,3,6,7,8-HxCDF	100	103	103	84-130
60851-34-5	LCS	2,3,4,6,7,8-HxCDF	100	97.9	97.9	70-156
72918-21-9	LCS	1,2,3,7,8,9-HxCDF	100	100	100	78-130
67562-39-4	LCS	1,2,3,4,6,7,8-HpCDF	100	101	101	82-122
55673-89-7	LCS	1,2,3,4,7,8,9-HpCDF	100	99.7	99.7	78-138
39001-02-0	LCS	1,2,3,4,6,7,8,9-OCDF	200	191	95.6	63-170

Hi-Res Dioxins/Furans

Quality Control Summary
Spike Recovery Report

SDG Number: L1701310 **Sample Type:** Laboratory Control Sample Duplicate

Client ID: LCSD for batch 34090 **Matrix:** TISSUE

Lab Sample ID: 12018126

Instrument: HRP791 **Analysis Date:** 02/25/2017 14:17 **Dilution:** 1

Analyst: MJC **Prep Batch ID:** 34090

Batch ID: 34092

CAS No.		Parmname	Amount Added pg/g	Spike Conc. pg/g	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
1746-01-6	LCSD	2,3,7,8-TCDD	20.0	18.8	94.2	67-158	1.69	0-20
40321-76-4	LCSD	1,2,3,7,8-PeCDD	100	98.4	98.4	70-142	0.901	0-20
39227-28-6	LCSD	1,2,3,4,7,8-HxCDD	100	101	101	70-164	2.71	0-20
57653-85-7	LCSD	1,2,3,6,7,8-HxCDD	100	98.2	98.2	76-134	3.64	0-20
19408-74-3	LCSD	1,2,3,7,8,9-HxCDD	100	107	107	64-162	0.561	0-20
35822-46-9	LCSD	1,2,3,4,6,7,8-HpCDD	100	99.8	99.8	70-140	1.20	0-20
3268-87-9	LCSD	1,2,3,4,6,7,8,9-OCDD	200	203	102	78-144	0.0463	0-20
51207-31-9	LCSD	2,3,7,8-TCDF	20.0	19.3	96.7	75-158	0.987	0-20
57117-41-6	LCSD	1,2,3,7,8-PeCDF	100	98.2	98.2	80-134	1.96	0-20
57117-31-4	LCSD	2,3,4,7,8-PeCDF	100	97.4	97.4	68-160	5.30	0-20
70648-26-9	LCSD	1,2,3,4,7,8-HxCDF	100	97.6	97.6	72-134	0.660	0-20
57117-44-9	LCSD	1,2,3,6,7,8-HxCDF	100	104	104	84-130	1.15	0-20
60851-34-5	LCSD	2,3,4,6,7,8-HxCDF	100	99.6	99.6	70-156	1.74	0-20
72918-21-9	LCSD	1,2,3,7,8,9-HxCDF	100	98.4	98.4	78-130	1.81	0-20
67562-39-4	LCSD	1,2,3,4,6,7,8-HpCDF	100	99.6	99.6	82-122	1.06	0-20
55673-89-7	LCSD	1,2,3,4,7,8,9-HpCDF	100	99.9	99.9	78-138	0.218	0-20
39001-02-0	LCSD	1,2,3,4,6,7,8,9-OCDF	200	189	94.6	63-170	0.969	0-20

Hi-Res Dioxins/Furans

Quality Control Summary
Spike Recovery Report

SDG Number: L1701310 **Sample Type:** Matrix Spike

Client ID: WC-FISH-3(10446003MS) **Matrix:** TISSUE

Lab Sample ID: 12018127

Instrument: HRP791 **Analysis Date:** 02/25/2017 19:07 **Dilution:** 1

Analyst: MJC **Prep Batch ID:** 34090

Batch ID: 34092

CAS No.		Parmname	Amount Added pg/g		Spike Conc. pg/g	Recovery %	Acceptance Limits
1746-01-6	MS	2,3,7,8-TCDD	19.8	U	17.9	90.3	70-130
40321-76-4	MS	1,2,3,7,8-PeCDD	99.1	U	93.8	94.6	70-130
39227-28-6	MS	1,2,3,4,7,8-HxCDD	99.1	U	92.5	93.3	70-130
57653-85-7	MS	1,2,3,6,7,8-HxCDD	99.1	U	96.2	97.1	70-130
19408-74-3	MS	1,2,3,7,8,9-HxCDD	99.1	U	105	106	70-130
35822-46-9	MS	1,2,3,4,6,7,8-HpCDD	99.1	U	95.6	96.5	70-130
3268-87-9	MS	1,2,3,4,6,7,8,9-OCDD	198	U	196	98.9	70-130
51207-31-9	MS	2,3,7,8-TCDF	19.8	U	18.5	93.2	70-130
57117-41-6	MS	1,2,3,7,8-PeCDF	99.1	U	96.5	97.4	70-130
57117-31-4	MS	2,3,4,7,8-PeCDF	99.1	U	94.1	95	70-130
70648-26-9	MS	1,2,3,4,7,8-HxCDF	99.1	U	93.5	94.4	70-130
57117-44-9	MS	1,2,3,6,7,8-HxCDF	99.1	U	97.9	98.8	70-130
60851-34-5	MS	2,3,4,6,7,8-HxCDF	99.1	U	94.4	95.2	70-130
72918-21-9	MS	1,2,3,7,8,9-HxCDF	99.1	U	95.0	95.8	70-130
67562-39-4	MS	1,2,3,4,6,7,8-HpCDF	99.1	U	94.2	95.1	70-130
55673-89-7	MS	1,2,3,4,7,8,9-HpCDF	99.1	U	92.2	93	70-130
39001-02-0	MS	1,2,3,4,6,7,8,9-OCDF	198	U	176	88.8	70-130

Hi-Res Dioxins/Furans

Quality Control Summary
Spike Recovery Report

SDG Number: L1701310 **Sample Type:** Matrix Spike Duplicate

Client ID: WC-FISH-3(10446003MSD) **Matrix:** TISSUE

Lab Sample ID: 12018128

Instrument: HRP791 **Analysis Date:** 02/25/2017 19:56 **Dilution:** 1

Analyst: MJC **Prep Batch ID:** 34090

Batch ID: 34092

CAS No.		Parmname	Amount Added pg/g		Spike Conc. pg/g	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
1746-01-6	MSD	2,3,7,8-TCDD	19.9	U	18.9	95.1	70-130	5.43	0-20
40321-76-4	MSD	1,2,3,7,8-PeCDD	99.3	U	99.1	99.7	70-130	5.47	0-20
39227-28-6	MSD	1,2,3,4,7,8-HxCDD	99.3	U	103	104	70-130	10.6	0-20
57653-85-7	MSD	1,2,3,6,7,8-HxCDD	99.3	U	95.2	95.9	70-130	1.10	0-20
19408-74-3	MSD	1,2,3,7,8,9-HxCDD	99.3	U	109	109	70-130	3.27	0-20
35822-46-9	MSD	1,2,3,4,6,7,8-HpCDD	99.3	U	101	101	70-130	5.21	0-20
3268-87-9	MSD	1,2,3,4,6,7,8,9-OCDD	199	U	209	105	70-130	6.56	0-20
51207-31-9	MSD	2,3,7,8-TCDF	19.9	U	18.8	94.7	70-130	1.78	0-20
57117-41-6	MSD	1,2,3,7,8-PeCDF	99.3	U	99.9	101	70-130	3.44	0-20
57117-31-4	MSD	2,3,4,7,8-PeCDF	99.3	U	99.2	99.9	70-130	5.28	0-20
70648-26-9	MSD	1,2,3,4,7,8-HxCDF	99.3	U	97.5	98.2	70-130	4.12	0-20
57117-44-9	MSD	1,2,3,6,7,8-HxCDF	99.3	U	102	103	70-130	4.49	0-20
60851-34-5	MSD	2,3,4,6,7,8-HxCDF	99.3	U	95.9	96.6	70-130	1.62	0-20
72918-21-9	MSD	1,2,3,7,8,9-HxCDF	99.3	U	100	101	70-130	5.40	0-20
67562-39-4	MSD	1,2,3,4,6,7,8-HpCDF	99.3	U	96.8	97.5	70-130	2.68	0-20
55673-89-7	MSD	1,2,3,4,7,8,9-HpCDF	99.3	U	98.2	98.9	70-130	6.27	0-20
39001-02-0	MSD	1,2,3,4,6,7,8,9-OCDF	199	U	188	94.8	70-130	6.79	0-20

Method Blank Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Matrix:**	**TISSUE**
Client ID:	**MB for batch 34090**	**Instrument ID:**	**HRP791**	**Data File:**	**c25feb17a-8**
Lab Sample ID:	**12018124**	**Prep Date:**	**23-FEB-17**	**Analyzed:**	**02/25/17 15:06**
Column:					

This method blank applies to the following samples and quality control samples:

	Client Sample ID	Lab Sample ID	File ID	Date Analyzed	Time Analyzed
01	LCS for batch 34090	12018125	c25feb17a-6	02/25/17	1329
02	LCSD for batch 34090	12018126	c25feb17a-7	02/25/17	1417
03	WC-FISH-1	10446001	c25feb17a-10	02/25/17	1642
04	WC-FISH-2	10446002	c25feb17a-11	02/25/17	1731
05	WC-FISH-3	10446003	c25feb17a-12	02/25/17	1819
06	WC-FISH-3(10446003MS)	12018127	c25feb17a-13	02/25/17	1907
07	WC-FISH-3(10446003MSD)	12018128	c25feb17a-14	02/25/17	1956

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**12018124**			**Matrix:**	**TISSUE**
Client Sample:	**QC for batch 34090**				
Client ID:	**MB for batch 34090**			**Prep Basis:**	**As Received**
Batch ID:	**34092**	**Method:**	**EPA Method 1613B**		
Run Date:	**02/25/2017 15:06**	**Analyst:**	**MJC**	**Instrument:**	**HRP791**
Data File:	**c25feb17a-8**			**Dilution:**	**1**
Prep Batch:	**34090**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**23-FEB-17**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
1746-01-6	2,3,7,8-TCDD	U	1	pg/g	1.00
40321-76-4	1,2,3,7,8-PeCDD	U	5	pg/g	5.00
39227-28-6	1,2,3,4,7,8-HxCDD	U	5	pg/g	5.00
57653-85-7	1,2,3,6,7,8-HxCDD	U	5	pg/g	5.00
19408-74-3	1,2,3,7,8,9-HxCDD	U	5	pg/g	5.00
35822-46-9	1,2,3,4,6,7,8-HpCDD	U	5	pg/g	5.00
3268-87-9	1,2,3,4,6,7,8,9-OCDD	U	10	pg/g	10.0
51207-31-9	2,3,7,8-TCDF	U	1	pg/g	1.00
57117-41-6	1,2,3,7,8-PeCDF	U	5	pg/g	5.00
57117-31-4	2,3,4,7,8-PeCDF	U	5	pg/g	5.00
70648-26-9	1,2,3,4,7,8-HxCDF	U	5	pg/g	5.00
57117-44-9	1,2,3,6,7,8-HxCDF	U	5	pg/g	5.00
60851-34-5	2,3,4,6,7,8-HxCDF	U	5	pg/g	5.00
72918-21-9	1,2,3,7,8,9-HxCDF	U	5	pg/g	5.00
67562-39-4	1,2,3,4,6,7,8-HpCDF	U	5	pg/g	5.00
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	5	pg/g	5.00
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	10	pg/g	10.0
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	U	1	pg/g	1.00
36088-22-9	Total Pentachlorodibenzo-p-dioxin	U	5	pg/g	5.00
34465-46-8	Total Hexachlorodibenzo-p-dioxin	U	5	pg/g	5.00
37871-00-4	Total Heptachlorodibenzo-p-dioxin	U	5	pg/g	5.00
30402-14-3	Total Tetrachlorodibenzofuran	U	1	pg/g	1.00
30402-15-4	Total Pentachlorodibenzofuran	U	5	pg/g	5.00
55684-94-1	Total Hexachlorodibenzofuran	U	5	pg/g	5.00
38998-75-3	Total Heptachlorodibenzofuran	U	5	pg/g	5.00
3333-30-0	TEQ WHO2005 ND=0		0.00	pg/g	
3333-30-1	TEQ WHO2005 ND=0.5		5.70	pg/g	

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		193	200	pg/g	96.5	(25%-164%)
13C-1,2,3,7,8-PeCDD		188	200	pg/g	94.2	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		177	200	pg/g	88.3	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		192	200	pg/g	95.8	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		177	200	pg/g	88.5	(23%-140%)
13C-OCDD		311	400	pg/g	77.6	(17%-157%)
13C-2,3,7,8-TCDF		167	200	pg/g	83.5	(24%-169%)
13C-1,2,3,7,8-PeCDF		173	200	pg/g	86.3	(24%-185%)
13C-2,3,4,7,8-PeCDF		173	200	pg/g	86.5	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		165	200	pg/g	82.7	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		162	200	pg/g	81.1	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		171	200	pg/g	85.6	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		177	200	pg/g	88.6	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**12018124**			**Matrix:**	**TISSUE**
Client Sample:	**QC for batch 34090**				
Client ID:	**MB for batch 34090**			**Prep Basis:**	**As Received**
Batch ID:	**34092**	**Method:**	**EPA Method 1613B**		
Run Date:	**02/25/2017 15:06**	**Analyst:**	**MJC**	**Instrument:**	**HRP791**
Data File:	**c25feb17a-8**			**Dilution:**	**1**
Prep Batch:	**34090**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**23-FEB-17**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		156	200	pg/g	78.2	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		158	200	pg/g	78.9	(26%-138%)
37Cl-2,3,7,8-TCDD		17.9	20.0	pg/g	89.4	(35%-197%)

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**12018125**			**Matrix:**	**TISSUE**
Client Sample:	**QC for batch 34090**				
Client ID:	**LCS for batch 34090**			**Prep Basis:**	**As Received**
Batch ID:	**34092**	**Method:**	**EPA Method 1613B**		
Run Date:	**02/25/2017 13:29**	**Analyst:**	**MJC**	**Instrument:**	**HRP791**
Data File:	**c25feb17a-6**			**Dilution:**	**1**
Prep Batch:	**34090**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**23-FEB-17**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
1746-01-6	2,3,7,8-TCDD		19.2	pg/g	1.00
40321-76-4	1,2,3,7,8-PeCDD		97.5	pg/g	5.00
39227-28-6	1,2,3,4,7,8-HxCDD		98.6	pg/g	5.00
57653-85-7	1,2,3,6,7,8-HxCDD		102	pg/g	5.00
19408-74-3	1,2,3,7,8,9-HxCDD		108	pg/g	5.00
35822-46-9	1,2,3,4,6,7,8-HpCDD		101	pg/g	5.00
3268-87-9	1,2,3,4,6,7,8,9-OCDD		203	pg/g	10.0
51207-31-9	2,3,7,8-TCDF		19.1	pg/g	1.00
57117-41-6	1,2,3,7,8-PeCDF		96.3	pg/g	5.00
57117-31-4	2,3,4,7,8-PeCDF		103	pg/g	5.00
70648-26-9	1,2,3,4,7,8-HxCDF		98.3	pg/g	5.00
57117-44-9	1,2,3,6,7,8-HxCDF		103	pg/g	5.00
60851-34-5	2,3,4,6,7,8-HxCDF		97.9	pg/g	5.00
72918-21-9	1,2,3,7,8,9-HxCDF		100	pg/g	5.00
67562-39-4	1,2,3,4,6,7,8-HpCDF		101	pg/g	5.00
55673-89-7	1,2,3,4,7,8,9-HpCDF		99.7	pg/g	5.00
39001-02-0	1,2,3,4,6,7,8,9-OCDF		191	pg/g	10.0

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		188	200	pg/g	93.8	(20%-175%)
13C-1,2,3,7,8-PeCDD		181	200	pg/g	90.7	(21%-227%)
13C-1,2,3,4,7,8-HxCDD		163	200	pg/g	81.4	(21%-193%)
13C-1,2,3,6,7,8-HxCDD		193	200	pg/g	96.6	(25%-163%)
13C-1,2,3,4,6,7,8-HpCDD		165	200	pg/g	82.3	(22%-166%)
13C-OCDD		291	400	pg/g	72.7	(13%-199%)
13C-2,3,7,8-TCDF		164	200	pg/g	81.9	(22%-152%)
13C-1,2,3,7,8-PeCDF		166	200	pg/g	82.9	(21%-192%)
13C-2,3,4,7,8-PeCDF		167	200	pg/g	83.7	(13%-328%)
13C-1,2,3,4,7,8-HxCDF		152	200	pg/g	76.0	(19%-202%)
13C-1,2,3,6,7,8-HxCDF		169	200	pg/g	84.7	(21%-159%)
13C-2,3,4,6,7,8-HxCDF		170	200	pg/g	84.9	(22%-176%)
13C-1,2,3,7,8,9-HxCDF		162	200	pg/g	81.0	(17%-205%)
13C-1,2,3,4,6,7,8-HpCDF		152	200	pg/g	76.1	(21%-158%)
13C-1,2,3,4,7,8,9-HpCDF		151	200	pg/g	75.7	(20%-186%)
37Cl-2,3,7,8-TCDD		16.9	20.0	pg/g	84.3	(31%-191%)

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**12018126**			**Matrix:**	**TISSUE**
Client Sample:	**QC for batch 34090**				
Client ID:	**LCSD for batch 34090**			**Prep Basis:**	**As Received**
Batch ID:	**34092**	**Method:**	**EPA Method 1613B**		
Run Date:	**02/25/2017 14:17**	**Analyst:**	**MJC**	**Instrument:**	**HRP791**
Data File:	**c25feb17a-7**			**Dilution:**	**1**
Prep Batch:	**34090**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**23-FEB-17**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
1746-01-6	2,3,7,8-TCDD		18.8	pg/g	1.00
40321-76-4	1,2,3,7,8-PeCDD		98.4	pg/g	5.00
39227-28-6	1,2,3,4,7,8-HxCDD		101	pg/g	5.00
57653-85-7	1,2,3,6,7,8-HxCDD		98.2	pg/g	5.00
19408-74-3	1,2,3,7,8,9-HxCDD		107	pg/g	5.00
35822-46-9	1,2,3,4,6,7,8-HpCDD		99.8	pg/g	5.00
3268-87-9	1,2,3,4,6,7,8,9-OCDD		203	pg/g	10.0
51207-31-9	2,3,7,8-TCDF		19.3	pg/g	1.00
57117-41-6	1,2,3,7,8-PeCDF		98.2	pg/g	5.00
57117-31-4	2,3,4,7,8-PeCDF		97.4	pg/g	5.00
70648-26-9	1,2,3,4,7,8-HxCDF		97.6	pg/g	5.00
57117-44-9	1,2,3,6,7,8-HxCDF		104	pg/g	5.00
60851-34-5	2,3,4,6,7,8-HxCDF		99.6	pg/g	5.00
72918-21-9	1,2,3,7,8,9-HxCDF		98.4	pg/g	5.00
67562-39-4	1,2,3,4,6,7,8-HpCDF		99.6	pg/g	5.00
55673-89-7	1,2,3,4,7,8,9-HpCDF		99.9	pg/g	5.00
39001-02-0	1,2,3,4,6,7,8,9-OCDF		189	pg/g	10.0

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		189	200	pg/g	94.3	(20%-175%)
13C-1,2,3,7,8-PeCDD		187	200	pg/g	93.3	(21%-227%)
13C-1,2,3,4,7,8-HxCDD		170	200	pg/g	85.0	(21%-193%)
13C-1,2,3,6,7,8-HxCDD		185	200	pg/g	92.5	(25%-163%)
13C-1,2,3,4,6,7,8-HpCDD		169	200	pg/g	84.7	(22%-166%)
13C-OCDD		287	400	pg/g	71.7	(13%-199%)
13C-2,3,7,8-TCDF		164	200	pg/g	82.1	(22%-152%)
13C-1,2,3,7,8-PeCDF		166	200	pg/g	83.2	(21%-192%)
13C-2,3,4,7,8-PeCDF		173	200	pg/g	86.5	(13%-328%)
13C-1,2,3,4,7,8-HxCDF		159	200	pg/g	79.3	(19%-202%)
13C-1,2,3,6,7,8-HxCDF		157	200	pg/g	78.5	(21%-159%)
13C-2,3,4,6,7,8-HxCDF		163	200	pg/g	81.7	(22%-176%)
13C-1,2,3,7,8,9-HxCDF		165	200	pg/g	82.5	(17%-205%)
13C-1,2,3,4,6,7,8-HpCDF		153	200	pg/g	76.7	(21%-158%)
13C-1,2,3,4,7,8,9-HpCDF		152	200	pg/g	76.0	(20%-186%)
37Cl-2,3,7,8-TCDD		18.1	20.0	pg/g	90.3	(31%-191%)

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**12018127**	**Date Collected:**	**01/13/2017 11:20**	**Matrix:**	**TISSUE**
Client Sample:	**QC for batch 34090**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-3(10446003MS)**			**Prep Basis:**	**As Received**
Batch ID:	**34092**	**Method:**	**EPA Method 1613B**		
Run Date:	**02/25/2017 19:07**	**Analyst:**	**MJC**	**Instrument:**	**HRP791**
Data File:	**c25feb17a-13**			**Dilution:**	**1**
Prep Batch:	**34090**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**23-FEB-17**	**Prep Aliquot:**	**10.09 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
1746-01-6	2,3,7,8-TCDD		17.9	pg/g	0.991
40321-76-4	1,2,3,7,8-PeCDD		93.8	pg/g	4.96
39227-28-6	1,2,3,4,7,8-HxCDD		92.5	pg/g	4.96
57653-85-7	1,2,3,6,7,8-HxCDD		96.2	pg/g	4.96
19408-74-3	1,2,3,7,8,9-HxCDD		105	pg/g	4.96
35822-46-9	1,2,3,4,6,7,8-HpCDD		95.6	pg/g	4.96
3268-87-9	1,2,3,4,6,7,8,9-OCDD		196	pg/g	9.91
51207-31-9	2,3,7,8-TCDF		18.5	pg/g	0.991
57117-41-6	1,2,3,7,8-PeCDF		96.5	pg/g	4.96
57117-31-4	2,3,4,7,8-PeCDF		94.1	pg/g	4.96
70648-26-9	1,2,3,4,7,8-HxCDF		93.5	pg/g	4.96
57117-44-9	1,2,3,6,7,8-HxCDF		97.9	pg/g	4.96
60851-34-5	2,3,4,6,7,8-HxCDF		94.4	pg/g	4.96
72918-21-9	1,2,3,7,8,9-HxCDF		95.0	pg/g	4.96
67562-39-4	1,2,3,4,6,7,8-HpCDF		94.2	pg/g	4.96
55673-89-7	1,2,3,4,7,8,9-HpCDF		92.2	pg/g	4.96
39001-02-0	1,2,3,4,6,7,8,9-OCDF		176	pg/g	9.91

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		185	198	pg/g	93.4	(25%-164%)
13C-1,2,3,7,8-PeCDD		188	198	pg/g	94.7	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		188	198	pg/g	94.6	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		176	198	pg/g	88.5	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		177	198	pg/g	89.2	(23%-140%)
13C-OCDD		317	396	pg/g	79.9	(17%-157%)
13C-2,3,7,8-TCDF		160	198	pg/g	80.7	(24%-169%)
13C-1,2,3,7,8-PeCDF		164	198	pg/g	83.0	(24%-185%)
13C-2,3,4,7,8-PeCDF		169	198	pg/g	85.4	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		164	198	pg/g	82.8	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		156	198	pg/g	78.8	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		163	198	pg/g	82.0	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		170	198	pg/g	85.9	(29%-147%)
13C-1,2,3,4,6,7,8-HpCDF		158	198	pg/g	79.5	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		165	198	pg/g	83.2	(26%-138%)
37Cl-2,3,7,8-TCDD		17.6	19.8	pg/g	88.6	(35%-197%)

Comments:

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**12018128**	**Date Collected:**	**01/13/2017 11:20**	**Matrix:**	**TISSUE**
Client Sample:	**QC for batch 34090**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-3(10446003MSD)**			**Prep Basis:**	**As Received**
Batch ID:	**34092**	**Method:**	**EPA Method 1613B**		
Run Date:	**02/25/2017 19:56**	**Analyst:**	**MJC**	**Instrument:**	**HRP791**
Data File:	**c25feb17a-14**			**Dilution:**	**1**
Prep Batch:	**34090**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**23-FEB-17**	**Prep Aliquot:**	**10.07 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
1746-01-6	2,3,7,8-TCDD		18.9	pg/g	0.993
40321-76-4	1,2,3,7,8-PeCDD		99.1	pg/g	4.97
39227-28-6	1,2,3,4,7,8-HxCDD		103	pg/g	4.97
57653-85-7	1,2,3,6,7,8-HxCDD		95.2	pg/g	4.97
19408-74-3	1,2,3,7,8,9-HxCDD		109	pg/g	4.97
35822-46-9	1,2,3,4,6,7,8-HpCDD		101	pg/g	4.97
3268-87-9	1,2,3,4,6,7,8,9-OCDD		209	pg/g	9.93
51207-31-9	2,3,7,8-TCDF		18.8	pg/g	0.993
57117-41-6	1,2,3,7,8-PeCDF		99.9	pg/g	4.97
57117-31-4	2,3,4,7,8-PeCDF		99.2	pg/g	4.97
70648-26-9	1,2,3,4,7,8-HxCDF		97.5	pg/g	4.97
57117-44-9	1,2,3,6,7,8-HxCDF		102	pg/g	4.97
60851-34-5	2,3,4,6,7,8-HxCDF		95.9	pg/g	4.97
72918-21-9	1,2,3,7,8,9-HxCDF		100	pg/g	4.97
67562-39-4	1,2,3,4,6,7,8-HpCDF		96.8	pg/g	4.97
55673-89-7	1,2,3,4,7,8,9-HpCDF		98.2	pg/g	4.97
39001-02-0	1,2,3,4,6,7,8,9-OCDF		188	pg/g	9.93

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		179	199	pg/g	90.0	(25%-164%)
13C-1,2,3,7,8-PeCDD		186	199	pg/g	93.6	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		163	199	pg/g	81.8	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		172	199	pg/g	86.4	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		163	199	pg/g	82.0	(23%-140%)
13C-OCDD		291	397	pg/g	73.2	(17%-157%)
13C-2,3,7,8-TCDF		158	199	pg/g	79.3	(24%-169%)
13C-1,2,3,7,8-PeCDF		165	199	pg/g	83.2	(24%-185%)
13C-2,3,4,7,8-PeCDF		167	199	pg/g	83.9	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		150	199	pg/g	75.6	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		146	199	pg/g	73.4	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		153	199	pg/g	77.0	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		159	199	pg/g	80.3	(29%-147%)
13C-1,2,3,4,6,7,8-HpCDF		143	199	pg/g	72.1	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		151	199	pg/g	75.9	(26%-138%)
37Cl-2,3,7,8-TCDD		16.8	19.9	pg/g	84.6	(35%-197%)

Comments:

PCB Congeners Analysis

Case Narrative

PCBC Case Narrative
Alpha Analytical Laboratory (ALPH)
SDG L1701310
Work Order 10446

Method/Analysis Information

Product:	**Method 1668C HRMS Tissue Analysis**
Analytical Method:	EPA Method 1668C
Extraction Method:	EPA Method 1668C
Analytical Batch Number:	34096
Clean Up Batch Number:	34095
Extraction Batch Number:	34094

Sample Analysis

The following samples were analyzed using the analytical protocol as established in EPA Method 1668C:

Sample ID	Client ID
10446001	WC-FISH-1
10446002	WC-FISH-2
10446003	WC-FISH-3
12018129	Method Blank (MB)
12018130	Laboratory Control Sample (LCS)
12018131	Laboratory Control Sample Duplicate (LCSD)

The samples in this SDG were analyzed on an "as received" basis.

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by Cape Fear Analytical LLC (CFA) as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with CF-OA-E-003 REV# 6.

Raw data reports are processed and reviewed by the analyst using the TargetLynx software package.

Calibration Information

Initial Calibration

All initial calibration requirements have been met for this sample delivery group (SDG).

Continuing Calibration Verification (CCV) Requirements
All associated calibration verification standard(s) (ICV or CCV) met the acceptance criteria.

Quality Control (QC) Information

Certification Statement
The test results presented in this document are certified to meet all requirements of the 2009 TNI Standard.

Method Blank (MB) Statement
The MB(s) analyzed with this SDG met the acceptance criteria.

Surrogate Recoveries
All surrogate recoveries were within the established acceptance criteria for this SDG.

Laboratory Control Sample (LCS) Recovery
The LCS spike recoveries met the acceptance limits.

Laboratory Control Sample Duplicate (LCSD) Recovery
The LCSD spike recoveries met the acceptance limits.

LCS/LCSD Relative Percent Difference (RPD) Statement
The RPD(s) between the LCS and LCSD met the acceptance limits.

QC Sample Designation
A matrix spike and matrix spike duplicate analysis was not required for this SDG.

Technical Information

Holding Time Specifications
CFA assigns holding times based on the associated methodology, which assigns the date and time from sample collection. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

Preparation/Analytical Method Verification
All procedures were performed as stated in the SOP.

Sample Dilutions
Samples 10446001 (WC-FISH-1), 10446002 (WC-FISH-2) and 10446003 (WC-FISH-3) were diluted due to the presence of over-range target analytes.

Sample Re-extraction/Re-analysis
Re-extractions or re-analyses were not required in this SDG.

Miscellaneous Information

Nonconformance (NCR) Documentation
A NCR was not required for this SDG.

Manual Integrations
Manual integrations were required for data files in this SDG. Certain standards and QC samples required manual integrations to correctly position the baseline as set in the calibration standard injections. Where manual integrations were performed, copies of all manual integration peak profiles are included in the raw data section of this fraction.

System Configuration

This analysis was performed on the following instrument configuration:

Instrument ID	Instrument	System Configuration	Column ID	Column Description
HRP875_1	PCB Analysis	PCB Analysis	SPB-Octyl	30m x 0.25mm, 0.25um

Electronic Packaging Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted: Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative will include the data validator's signature and title. The signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Sample Data Summary

Cape Fear Analytical, LLC

3306 Kitty Hawk Road Suite 120, Wilmington, NC 28405 - (910) 795-0421 - www.capefearanalytical.com

Certificate of Analysis Report
for

ALPH001 Alpha Analytical Laboratory

Client SDG: L1701310 CFA Work Order: 10446

The Qualifiers in this report are defined as follows:

* A quality control analyte recovery is outside of specified acceptance criteria

** Analyte is a surrogate compound

C Congener has coeluters. When Cxxx, refer to congener number xxx for data

U Analyte was analyzed for, but not detected above the specified detection limit.

Review/Validation

Cape Fear Analytical requires all analytical data to be verified by a qualified data reviewer.

The following data validator verified the information presented in this case narrative:

Signature:  **Name: Heather Patterson**

Date: 07 MAR 2017 **Title: Group Leader**

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446001**	**Date Collected:**	**01/13/2017 10:30**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-1**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**03/04/2017 11:32**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d03mar17a_3-3**			**Dilution:**	**5**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10.74 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
2051-60-7	1-MoCB	U	9.31	pg/g	9.31
2051-61-8	2-MoCB	U	9.31	pg/g	9.31
2051-62-9	3-MoCB	U	9.31	pg/g	9.31
13029-08-8	4-DiCB		29.6	pg/g	9.31
16605-91-7	5-DiCB	U	9.31	pg/g	9.31
25569-80-6	6-DiCB	U	9.31	pg/g	9.31
33284-50-3	7-DiCB	U	9.31	pg/g	9.31
34883-43-7	8-DiCB		32.2	pg/g	9.31
34883-39-1	9-DiCB	U	9.31	pg/g	9.31
33146-45-1	10-DiCB	U	9.31	pg/g	9.31
2050-67-1	11-DiCB	U	93.1	pg/g	93.1
2974-92-7	12-DiCB	CU	18.6	pg/g	18.6
2974-90-5	13-DiCB	C12			
34883-41-5	14-DiCB	U	9.31	pg/g	9.31
2050-68-2	15-DiCB	U	9.31	pg/g	9.31
38444-78-9	16-TrCB		29.2	pg/g	9.31
37680-66-3	17-TrCB		124	pg/g	9.31
37680-65-2	18-TrCB	C	98.2	pg/g	18.6
38444-73-4	19-TrCB		12.4	pg/g	9.31
38444-84-7	20-TrCB	C	1670	pg/g	18.6
55702-46-0	21-TrCB	C	53.5	pg/g	18.6
38444-85-8	22-TrCB		132	pg/g	9.31
55720-44-0	23-TrCB	U	9.31	pg/g	9.31
55702-45-9	24-TrCB	U	9.31	pg/g	9.31
55712-37-3	25-TrCB		26.8	pg/g	9.31
38444-81-4	26-TrCB	C	105	pg/g	18.6
38444-76-7	27-TrCB		22.0	pg/g	9.31
7012-37-5	28-TrCB	C20			
15862-07-4	29-TrCB	C26			
35693-92-6	30-TrCB	C18			
16606-02-3	31-TrCB		612	pg/g	9.31
38444-77-8	32-TrCB		174	pg/g	9.31

Comments:

C Congener has coeluters. When Cxxx, refer to congener number xxx for data

U Analyte was analyzed for, but not detected above the specified detection limit.

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446001**	**Date Collected:**	**01/13/2017 10:30**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-1**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**03/04/2017 11:32**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d03mar17a_3-3**			**Dilution:**	**5**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10.74 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
38444-86-9	33-TrCB	C21			
37680-68-5	34-TrCB	U	9.31	pg/g	9.31
37680-69-6	35-TrCB	U	9.31	pg/g	9.31
38444-87-0	36-TrCB	U	9.31	pg/g	9.31
38444-90-5	37-TrCB		21.1	pg/g	9.31
53555-66-1	38-TrCB	U	9.31	pg/g	9.31
38444-88-1	39-TrCB	U	9.31	pg/g	9.31
38444-93-8	40-TeCB	C	656	pg/g	18.6
52663-59-9	41-TeCB		36.2	pg/g	9.31
36559-22-5	42-TeCB		423	pg/g	9.31
70362-46-8	43-TeCB		83.1	pg/g	9.31
41464-39-5	44-TeCB	C	2430	pg/g	27.9
70362-45-7	45-TeCB	C	106	pg/g	18.6
41464-47-5	46-TeCB	U	9.31	pg/g	9.31
2437-79-8	47-TeCB	C44			
70362-47-9	48-TeCB		67.6	pg/g	9.31
41464-40-8	49-TeCB	C	2390	pg/g	18.6
62796-65-0	50-TeCB	C	101	pg/g	18.6
68194-04-7	51-TeCB	C45			
35693-99-3	52-TeCB		3580	pg/g	9.31
41464-41-9	53-TeCB	C50			
15968-05-5	54-TeCB	U	9.31	pg/g	9.31
74338-24-2	55-TeCB		72.8	pg/g	9.31
41464-43-1	56-TeCB		73.3	pg/g	9.31
70424-67-8	57-TeCB	U	9.31	pg/g	9.31
41464-49-7	58-TeCB	U	9.31	pg/g	9.31
74472-33-6	59-TeCB	C	252	pg/g	27.9
33025-41-1	60-TeCB		648	pg/g	9.31
33284-53-6	61-TeCB	C	3980	pg/g	37.2
54230-22-7	62-TeCB	C59			
74472-34-7	63-TeCB		210	pg/g	9.31
52663-58-8	64-TeCB		1330	pg/g	9.31

Comments:

C **Congener has coeluters. When Cxxx, refer to congener number xxx for data**

U **Analyte was analyzed for, but not detected above the specified detection limit.**

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446001**	**Date Collected:**	**01/13/2017 10:30**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-1**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**03/04/2017 11:32**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d03mar17a_3-3**			**Dilution:**	**5**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10.74 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
33284-54-7	65-TeCB	C44			
32598-10-0	66-TeCB		4080	pg/g	9.31
73575-53-8	67-TeCB	U	9.31	pg/g	9.31
73575-52-7	68-TeCB		79.7	pg/g	9.31
60233-24-1	69-TeCB	C49			
32598-11-1	70-TeCB	C61			
41464-46-4	71-TeCB	C40			
41464-42-0	72-TeCB		94.3	pg/g	9.31
74338-23-1	73-TeCB		52.9	pg/g	9.31
32690-93-0	74-TeCB	C61			
32598-12-2	75-TeCB	C59			
70362-48-0	76-TeCB	C61			
32598-13-3	77-TeCB		28.0	pg/g	9.31
70362-49-1	78-TeCB	U	9.31	pg/g	9.31
41464-48-6	79-TeCB		24.0	pg/g	9.31
33284-52-5	80-TeCB	U	9.31	pg/g	9.31
70362-50-4	81-TeCB	U	9.31	pg/g	9.31
52663-62-4	82-PeCB		68.5	pg/g	9.31
60145-20-2	83-PeCB		71.3	pg/g	9.31
52663-60-2	84-PeCB		93.6	pg/g	9.31
65510-45-4	85-PeCB	C	1300	pg/g	27.9
55312-69-1	86-PeCB	C	2510	pg/g	55.9
38380-02-8	87-PeCB	C86			
55215-17-3	88-PeCB	C	681	pg/g	18.6
73575-57-2	89-PeCB		14.5	pg/g	9.31
68194-07-0	90-PeCB	C	6620	pg/g	27.9
68194-05-8	91-PeCB	C88			
52663-61-3	92-PeCB		1520	pg/g	9.31
73575-56-1	93-PeCB	C	118	pg/g	18.6
73575-55-0	94-PeCB	U	9.31	pg/g	9.31
38379-99-6	95-PeCB		2580	pg/g	9.31
73575-54-9	96-PeCB	U	9.31	pg/g	9.31

Comments:

C **Congener has coeluters. When Cxxx, refer to congener number xxx for data**

U **Analyte was analyzed for, but not detected above the specified detection limit.**

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446001**	**Date Collected:**	**01/13/2017 10:30**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-1**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**03/04/2017 11:32**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d03mar17a_3-3**			**Dilution:**	**5**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10.74 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
41464-51-1	97-PeCB	C86			
60233-25-2	98-PeCB	C	140	pg/g	18.6
38380-01-7	99-PeCB		6070	pg/g	9.31
39485-83-1	100-PeCB	C93			
37680-73-2	101-PeCB	C90			
68194-06-9	102-PeCB	C98			
60145-21-3	103-PeCB		88.1	pg/g	9.31
56558-16-8	104-PeCB	U	9.31	pg/g	9.31
32598-14-4	105-PeCB		2160	pg/g	9.31
70424-69-0	106-PeCB	U	9.31	pg/g	9.31
70424-68-9	107-PeCB		670	pg/g	9.31
70362-41-3	108-PeCB	C	57.0	pg/g	18.6
74472-35-8	109-PeCB	C86			
38380-03-9	110-PeCB	C	6340	pg/g	18.6
39635-32-0	111-PeCB		16.3	pg/g	9.31
74472-36-9	112-PeCB		47.2	pg/g	9.31
68194-10-5	113-PeCB	C90			
74472-37-0	114-PeCB		101	pg/g	9.31
74472-38-1	115-PeCB	C110			
18259-05-7	116-PeCB	C85			
68194-11-6	117-PeCB	C85			
31508-00-6	118-PeCB		7710	pg/g	9.31
56558-17-9	119-PeCB	C86			
68194-12-7	120-PeCB		76.2	pg/g	9.31
56558-18-0	121-PeCB	U	9.31	pg/g	9.31
76842-07-4	122-PeCB	U	9.31	pg/g	9.31
65510-44-3	123-PeCB		96.0	pg/g	9.31
70424-70-3	124-PeCB	C108			
74472-39-2	125-PeCB	C86			
57465-28-8	126-PeCB		21.7	pg/g	9.31
39635-33-1	127-PeCB	U	9.31	pg/g	9.31
38380-07-3	128-HxCB	C	1100	pg/g	18.6

Comments:

C Congener has coeluters. When Cxxx, refer to congener number xxx for data

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PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446001**	**Date Collected:**	**01/13/2017 10:30**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-1**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**03/04/2017 11:32**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d03mar17a_3-3**			**Dilution:**	**5**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10.74 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
55215-18-4	129-HxCB	C	10200	pg/g	27.9
52663-66-8	130-HxCB		539	pg/g	9.31
61798-70-7	131-HxCB	U	9.31	pg/g	9.31
38380-05-1	132-HxCB		1160	pg/g	9.31
35694-04-3	133-HxCB		255	pg/g	9.31
52704-70-8	134-HxCB		36.8	pg/g	9.31
52744-13-5	135-HxCB	C	1910	pg/g	18.6
38411-22-2	136-HxCB		163	pg/g	9.31
35694-06-5	137-HxCB		291	pg/g	9.31
35065-28-2	138-HxCB	C129			
56030-56-9	139-HxCB	C	119	pg/g	18.6
59291-64-4	140-HxCB	C139			
52712-04-6	141-HxCB		605	pg/g	9.31
41411-61-4	142-HxCB	U	9.31	pg/g	9.31
68194-15-0	143-HxCB	U	9.31	pg/g	9.31
68194-14-9	144-HxCB		149	pg/g	9.31
74472-40-5	145-HxCB	U	9.31	pg/g	9.31
51908-16-8	146-HxCB		2160	pg/g	9.31
68194-13-8	147-HxCB	C	5140	pg/g	18.6
74472-41-6	148-HxCB		30.9	pg/g	9.31
38380-04-0	149-HxCB	C147			
68194-08-1	150-HxCB		13.1	pg/g	9.31
52663-63-5	151-HxCB	C135			
68194-09-2	152-HxCB	U	9.31	pg/g	9.31
35065-27-1	153-HxCB	C	12200	pg/g	18.6
60145-22-4	154-HxCB		259	pg/g	9.31
33979-03-2	155-HxCB		25.3	pg/g	9.31
38380-08-4	156-HxCB	C	620	pg/g	18.6
69782-90-7	157-HxCB	C156			
74472-42-7	158-HxCB		501	pg/g	9.31
39635-35-3	159-HxCB	U	9.31	pg/g	9.31
41411-62-5	160-HxCB	U	9.31	pg/g	9.31

Comments:

C Congener has coeluters. When Cxxx, refer to congener number xxx for data

U Analyte was analyzed for, but not detected above the specified detection limit.

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446001**	**Date Collected:**	**01/13/2017 10:30**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-1**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**03/04/2017 11:32**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d03mar17a_3-3**			**Dilution:**	**5**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10.74 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
74472-43-8	161-HxCB	U	9.31	pg/g	9.31
39635-34-2	162-HxCB		41.8	pg/g	9.31
74472-44-9	163-HxCB	C129			
74472-45-0	164-HxCB		391	pg/g	9.31
74472-46-1	165-HxCB		13.6	pg/g	9.31
41411-63-6	166-HxCB	C128			
52663-72-6	167-HxCB		411	pg/g	9.31
59291-65-5	168-HxCB	C153			
32774-16-6	169-HxCB	U	9.31	pg/g	9.31
35065-30-6	170-HpCB		1330	pg/g	9.31
52663-71-5	171-HpCB	C	392	pg/g	18.6
52663-74-8	172-HpCB		213	pg/g	9.31
68194-16-1	173-HpCB	C171			
38411-25-5	174-HpCB		836	pg/g	9.31
40186-70-7	175-HpCB		66.1	pg/g	9.31
52663-65-7	176-HpCB		83.6	pg/g	9.31
52663-70-4	177-HpCB		1230	pg/g	9.31
52663-67-9	178-HpCB		655	pg/g	9.31
52663-64-6	179-HpCB		190	pg/g	9.31
35065-29-3	180-HpCB	C	4010	pg/g	18.6
74472-47-2	181-HpCB		11.1	pg/g	9.31
60145-23-5	182-HpCB		10.1	pg/g	9.31
52663-69-1	183-HpCB	C	1300	pg/g	18.6
74472-48-3	184-HpCB	U	9.31	pg/g	9.31
52712-05-7	185-HpCB	C183			
74472-49-4	186-HpCB	U	9.31	pg/g	9.31
52663-68-0	187-HpCB		4760	pg/g	9.31
74487-85-7	188-HpCB		21.0	pg/g	9.31
39635-31-9	189-HpCB		27.2	pg/g	9.31
41411-64-7	190-HpCB		154	pg/g	9.31
74472-50-7	191-HpCB		54.7	pg/g	9.31
74472-51-8	192-HpCB	U	9.31	pg/g	9.31

Comments:

C Congener has coeluters. When Cxxx, refer to congener number xxx for data

U Analyte was analyzed for, but not detected above the specified detection limit.

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446001**	**Date Collected:**	**01/13/2017 10:30**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-1**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**03/04/2017 11:32**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d03mar17a_3-3**			**Dilution:**	**5**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10.74 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
69782-91-8	193-HpCB	C180			
35694-08-7	194-OcCB		396	pg/g	9.31
52663-78-2	195-OcCB		222	pg/g	9.31
42740-50-1	196-OcCB		450	pg/g	9.31
33091-17-7	197-OcCB	C	91.4	pg/g	18.6
68194-17-2	198-OcCB	C	1270	pg/g	18.6
52663-75-9	199-OcCB	C198			
52663-73-7	200-OcCB	C197			
40186-71-8	201-OcCB		170	pg/g	9.31
2136-99-4	202-OcCB		672	pg/g	9.31
52663-76-0	203-OcCB		428	pg/g	9.31
74472-52-9	204-OcCB	U	9.31	pg/g	9.31
74472-53-0	205-OcCB	U	9.31	pg/g	9.31
40186-72-9	206-NoCB		155	pg/g	9.31
52663-79-3	207-NoCB		69.3	pg/g	9.31
52663-77-1	208-NoCB		238	pg/g	9.31
2051-24-3	209-DeCB		257	pg/g	9.31
1336-36-3	Total PCB Congeners		121000	pg/g	9.31

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1-MoCB		91.0	186	pg/g	48.9	(5%-145%)
13C-3-MoCB		100	186	pg/g	53.7	(5%-145%)
13C-4-DiCB		82.9	186	pg/g	44.5	(5%-145%)
13C-15-DiCB		155	186	pg/g	83.3	(5%-145%)
13C-19-TrCB		131	186	pg/g	70.5	(5%-145%)
13C-37-TrCB		197	186	pg/g	106	(5%-145%)
13C-54-TeCB		110	186	pg/g	58.8	(5%-145%)
13C-77-TeCB		212	186	pg/g	114	(10%-145%)
13C-81-TeCB		215	186	pg/g	116	(10%-145%)
13C-104-PeCB		96.7	186	pg/g	51.9	(10%-145%)
13C-105-PeCB		176	186	pg/g	94.3	(10%-145%)
13C-114-PeCB		173	186	pg/g	92.7	(10%-145%)
13C-118-PeCB		175	186	pg/g	93.7	(10%-145%)
13C-123-PeCB		182	186	pg/g	97.9	(10%-145%)
13C-126-PeCB		174	186	pg/g	93.2	(10%-145%)
13C-155-HxCB		112	186	pg/g	60.2	(10%-145%)
13C-156-HxCB	C	312	372	pg/g	83.7	(10%-145%)
13C-157-HxCB	C156L					
13C-167-HxCB		158	186	pg/g	84.6	(10%-145%)
13C-169-HxCB		163	186	pg/g	87.4	(10%-145%)
13C-188-HpCB		159	186	pg/g	85.2	(10%-145%)
13C-189-HpCB		184	186	pg/g	98.9	(10%-145%)

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446001**	**Date Collected:**	**01/13/2017 10:30**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-1**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**03/04/2017 11:32**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d03mar17a_3-3**			**Dilution:**	**5**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10.74 g**		

CAS No.	Parmname	Qual	Result	Units	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-202-OcCB		150	186	pg/g	80.5	(10%-145%)
13C-205-OcCB		178	186	pg/g	95.4	(10%-145%)
13C-206-NoCB		209	186	pg/g	112	(10%-145%)
13C-208-NoCB		154	186	pg/g	82.8	(10%-145%)
13C-209-DeCB		158	186	pg/g	84.8	(10%-145%)
13C-28-TrCB		164	186	pg/g	88.1	(5%-145%)
13C-111-PeCB		156	186	pg/g	83.8	(10%-145%)
13C-178-HpCB		133	186	pg/g	71.5	(10%-145%)

Comments:

C **Congener has coeluters. When Cxxx, refer to congener number xxx for data**

U **Analyte was analyzed for, but not detected above the specified detection limit.**

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446002**	**Date Collected:**	**01/13/2017 11:00**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-2**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**03/04/2017 12:41**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d03mar17a_3-4**			**Dilution:**	**5**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10.5 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
2051-60-7	1-MoCB	U	9.52	pg/g	9.52
2051-61-8	2-MoCB	U	9.52	pg/g	9.52
2051-62-9	3-MoCB	U	9.52	pg/g	9.52
13029-08-8	4-DiCB		37.3	pg/g	9.52
16605-91-7	5-DiCB	U	9.52	pg/g	9.52
25569-80-6	6-DiCB	U	9.52	pg/g	9.52
33284-50-3	7-DiCB	U	9.52	pg/g	9.52
34883-43-7	8-DiCB		36.0	pg/g	9.52
34883-39-1	9-DiCB	U	9.52	pg/g	9.52
33146-45-1	10-DiCB	U	9.52	pg/g	9.52
2050-67-1	11-DiCB	U	95.2	pg/g	95.2
2974-92-7	12-DiCB	CU	19	pg/g	19.0
2974-90-5	13-DiCB	C12			
34883-41-5	14-DiCB	U	9.52	pg/g	9.52
2050-68-2	15-DiCB	U	9.52	pg/g	9.52
38444-78-9	16-TrCB		38.1	pg/g	9.52
37680-66-3	17-TrCB		145	pg/g	9.52
37680-65-2	18-TrCB	C	113	pg/g	19.0
38444-73-4	19-TrCB		16.7	pg/g	9.52
38444-84-7	20-TrCB	C	1760	pg/g	19.0
55702-46-0	21-TrCB	C	70.3	pg/g	19.0
38444-85-8	22-TrCB		155	pg/g	9.52
55720-44-0	23-TrCB	U	9.52	pg/g	9.52
55702-45-9	24-TrCB	U	9.52	pg/g	9.52
55712-37-3	25-TrCB		36.8	pg/g	9.52
38444-81-4	26-TrCB	C	124	pg/g	19.0
38444-76-7	27-TrCB		27.8	pg/g	9.52
7012-37-5	28-TrCB	C20			
15862-07-4	29-TrCB	C26			
35693-92-6	30-TrCB	C18			
16606-02-3	31-TrCB		710	pg/g	9.52
38444-77-8	32-TrCB		188	pg/g	9.52

Comments:

C Congener has coeluters. When Cxxx, refer to congener number xxx for data

U Analyte was analyzed for, but not detected above the specified detection limit.

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446002**	**Date Collected:**	**01/13/2017 11:00**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-2**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**03/04/2017 12:41**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d03mar17a_3-4**			**Dilution:**	**5**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10.5 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
38444-86-9	33-TrCB	C21			
37680-68-5	34-TrCB	U	9.52	pg/g	9.52
37680-69-6	35-TrCB	U	9.52	pg/g	9.52
38444-87-0	36-TrCB	U	9.52	pg/g	9.52
38444-90-5	37-TrCB		23.6	pg/g	9.52
53555-66-1	38-TrCB	U	9.52	pg/g	9.52
38444-88-1	39-TrCB	U	9.52	pg/g	9.52
38444-93-8	40-TeCB	C	707	pg/g	19.0
52663-59-9	41-TeCB		45.7	pg/g	9.52
36559-22-5	42-TeCB		440	pg/g	9.52
70362-46-8	43-TeCB		87.4	pg/g	9.52
41464-39-5	44-TeCB	C	2610	pg/g	28.6
70362-45-7	45-TeCB	C	113	pg/g	19.0
41464-47-5	46-TeCB		9.83	pg/g	9.52
2437-79-8	47-TeCB	C44			
70362-47-9	48-TeCB		78.6	pg/g	9.52
41464-40-8	49-TeCB	C	2580	pg/g	19.0
62796-65-0	50-TeCB	C	105	pg/g	19.0
68194-04-7	51-TeCB	C45			
35693-99-3	52-TeCB		3800	pg/g	9.52
41464-41-9	53-TeCB	C50			
15968-05-5	54-TeCB	U	9.52	pg/g	9.52
74338-24-2	55-TeCB		82.8	pg/g	9.52
41464-43-1	56-TeCB		97.9	pg/g	9.52
70424-67-8	57-TeCB	U	9.52	pg/g	9.52
41464-49-7	58-TeCB	U	9.52	pg/g	9.52
74472-33-6	59-TeCB	C	276	pg/g	28.6
33025-41-1	60-TeCB		631	pg/g	9.52
33284-53-6	61-TeCB	C	4260	pg/g	38.1
54230-22-7	62-TeCB	C59			
74472-34-7	63-TeCB		203	pg/g	9.52
52663-58-8	64-TeCB		1390	pg/g	9.52

Comments:

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PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446002**	**Date Collected:**	**01/13/2017 11:00**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-2**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**03/04/2017 12:41**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d03mar17a_3-4**			**Dilution:**	**5**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10.5 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
33284-54-7	65-TeCB	C44			
32598-10-0	66-TeCB		4200	pg/g	9.52
73575-53-8	67-TeCB	U	9.52	pg/g	9.52
73575-52-7	68-TeCB		83.9	pg/g	9.52
60233-24-1	69-TeCB	C49			
32598-11-1	70-TeCB	C61			
41464-46-4	71-TeCB	C40			
41464-42-0	72-TeCB		108	pg/g	9.52
74338-23-1	73-TeCB		61.5	pg/g	9.52
32690-93-0	74-TeCB	C61			
32598-12-2	75-TeCB	C59			
70362-48-0	76-TeCB	C61			
32598-13-3	77-TeCB		37.9	pg/g	9.52
70362-49-1	78-TeCB	U	9.52	pg/g	9.52
41464-48-6	79-TeCB		24.0	pg/g	9.52
33284-52-5	80-TeCB	U	9.52	pg/g	9.52
70362-50-4	81-TeCB	U	9.52	pg/g	9.52
52663-62-4	82-PeCB		63.4	pg/g	9.52
60145-20-2	83-PeCB		62.5	pg/g	9.52
52663-60-2	84-PeCB		113	pg/g	9.52
65510-45-4	85-PeCB	C	1370	pg/g	28.6
55312-69-1	86-PeCB	C	2610	pg/g	57.1
38380-02-8	87-PeCB	C86			
55215-17-3	88-PeCB	C	694	pg/g	19.0
73575-57-2	89-PeCB		15.0	pg/g	9.52
68194-07-0	90-PeCB	C	7050	pg/g	28.6
68194-05-8	91-PeCB	C88			
52663-61-3	92-PeCB		1590	pg/g	9.52
73575-56-1	93-PeCB	C	115	pg/g	19.0
73575-55-0	94-PeCB	U	9.52	pg/g	9.52
38379-99-6	95-PeCB		2630	pg/g	9.52
73575-54-9	96-PeCB	U	9.52	pg/g	9.52

Comments:

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PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446002**	**Date Collected:**	**01/13/2017 11:00**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-2**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**03/04/2017 12:41**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d03mar17a_3-4**			**Dilution:**	**5**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10.5 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
41464-51-1	97-PeCB	C86			
60233-25-2	98-PeCB	C	144	pg/g	19.0
38380-01-7	99-PeCB		6130	pg/g	9.52
39485-83-1	100-PeCB	C93			
37680-73-2	101-PeCB	C90			
68194-06-9	102-PeCB	C98			
60145-21-3	103-PeCB		90.7	pg/g	9.52
56558-16-8	104-PeCB	U	9.52	pg/g	9.52
32598-14-4	105-PeCB		2240	pg/g	9.52
70424-69-0	106-PeCB	U	9.52	pg/g	9.52
70424-68-9	107-PeCB		686	pg/g	9.52
70362-41-3	108-PeCB	C	67.5	pg/g	19.0
74472-35-8	109-PeCB	C86			
38380-03-9	110-PeCB	C	6450	pg/g	19.0
39635-32-0	111-PeCB		16.3	pg/g	9.52
74472-36-9	112-PeCB		56.2	pg/g	9.52
68194-10-5	113-PeCB	C90			
74472-37-0	114-PeCB		102	pg/g	9.52
74472-38-1	115-PeCB	C110			
18259-05-7	116-PeCB	C85			
68194-11-6	117-PeCB	C85			
31508-00-6	118-PeCB		7830	pg/g	9.52
56558-17-9	119-PeCB	C86			
68194-12-7	120-PeCB		77.9	pg/g	9.52
56558-18-0	121-PeCB	U	9.52	pg/g	9.52
76842-07-4	122-PeCB	U	9.52	pg/g	9.52
65510-44-3	123-PeCB		87.3	pg/g	9.52
70424-70-3	124-PeCB	C108			
74472-39-2	125-PeCB	C86			
57465-28-8	126-PeCB		19.3	pg/g	9.52
39635-33-1	127-PeCB	U	9.52	pg/g	9.52
38380-07-3	128-HxCB	C	1110	pg/g	19.0

Comments:

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Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446002**	**Date Collected:**	**01/13/2017 11:00**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-2**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**03/04/2017 12:41**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d03mar17a_3-4**			**Dilution:**	**5**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10.5 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
55215-18-4	129-HxCB	C	10400	pg/g	28.6
52663-66-8	130-HxCB		555	pg/g	9.52
61798-70-7	131-HxCB	U	9.52	pg/g	9.52
38380-05-1	132-HxCB		1130	pg/g	9.52
35694-04-3	133-HxCB		266	pg/g	9.52
52704-70-8	134-HxCB		86.9	pg/g	9.52
52744-13-5	135-HxCB	C	1940	pg/g	19.0
38411-22-2	136-HxCB		165	pg/g	9.52
35694-06-5	137-HxCB		324	pg/g	9.52
35065-28-2	138-HxCB	C129			
56030-56-9	139-HxCB	C	122	pg/g	19.0
59291-64-4	140-HxCB	C139			
52712-04-6	141-HxCB		619	pg/g	9.52
41411-61-4	142-HxCB	U	9.52	pg/g	9.52
68194-15-0	143-HxCB		14.2	pg/g	9.52
68194-14-9	144-HxCB		154	pg/g	9.52
74472-40-5	145-HxCB	U	9.52	pg/g	9.52
51908-16-8	146-HxCB		2200	pg/g	9.52
68194-13-8	147-HxCB	C	4980	pg/g	19.0
74472-41-6	148-HxCB		33.0	pg/g	9.52
38380-04-0	149-HxCB	C147			
68194-08-1	150-HxCB		12.0	pg/g	9.52
52663-63-5	151-HxCB	C135			
68194-09-2	152-HxCB	U	9.52	pg/g	9.52
35065-27-1	153-HxCB	C	12400	pg/g	19.0
60145-22-4	154-HxCB		264	pg/g	9.52
33979-03-2	155-HxCB		23.1	pg/g	9.52
38380-08-4	156-HxCB	C	629	pg/g	19.0
69782-90-7	157-HxCB	C156			
74472-42-7	158-HxCB		503	pg/g	9.52
39635-35-3	159-HxCB	U	9.52	pg/g	9.52
41411-62-5	160-HxCB	U	9.52	pg/g	9.52

Comments:

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PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446002**	**Date Collected:**	**01/13/2017 11:00**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-2**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**03/04/2017 12:41**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d03mar17a_3-4**			**Dilution:**	**5**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10.5 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
74472-43-8	161-HxCB	U	9.52	pg/g	9.52
39635-34-2	162-HxCB		42.2	pg/g	9.52
74472-44-9	163-HxCB	C129			
74472-45-0	164-HxCB		363	pg/g	9.52
74472-46-1	165-HxCB		10.3	pg/g	9.52
41411-63-6	166-HxCB	C128			
52663-72-6	167-HxCB		414	pg/g	9.52
59291-65-5	168-HxCB	C153			
32774-16-6	169-HxCB	U	9.52	pg/g	9.52
35065-30-6	170-HpCB		1400	pg/g	9.52
52663-71-5	171-HpCB	C	403	pg/g	19.0
52663-74-8	172-HpCB		229	pg/g	9.52
68194-16-1	173-HpCB	C171			
38411-25-5	174-HpCB		796	pg/g	9.52
40186-70-7	175-HpCB		66.6	pg/g	9.52
52663-65-7	176-HpCB		86.4	pg/g	9.52
52663-70-4	177-HpCB		1300	pg/g	9.52
52663-67-9	178-HpCB		720	pg/g	9.52
52663-64-6	179-HpCB		192	pg/g	9.52
35065-29-3	180-HpCB	C	4100	pg/g	19.0
74472-47-2	181-HpCB		11.5	pg/g	9.52
60145-23-5	182-HpCB		11.2	pg/g	9.52
52663-69-1	183-HpCB	C	1320	pg/g	19.0
74472-48-3	184-HpCB	U	9.52	pg/g	9.52
52712-05-7	185-HpCB	C183			
74472-49-4	186-HpCB	U	9.52	pg/g	9.52
52663-68-0	187-HpCB		5150	pg/g	9.52
74487-85-7	188-HpCB		21.5	pg/g	9.52
39635-31-9	189-HpCB		28.0	pg/g	9.52
41411-64-7	190-HpCB		163	pg/g	9.52
74472-50-7	191-HpCB		55.3	pg/g	9.52
74472-51-8	192-HpCB	U	9.52	pg/g	9.52

Comments:

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PCB Congeners
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Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446002**	**Date Collected:**	**01/13/2017 11:00**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-2**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**03/04/2017 12:41**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d03mar17a_3-4**			**Dilution:**	**5**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10.5 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
69782-91-8	193-HpCB	C180			
35694-08-7	194-OcCB		471	pg/g	9.52
52663-78-2	195-OcCB		235	pg/g	9.52
42740-50-1	196-OcCB		455	pg/g	9.52
33091-17-7	197-OcCB	C	82.1	pg/g	19.0
68194-17-2	198-OcCB	C	1310	pg/g	19.0
52663-75-9	199-OcCB	C198			
52663-73-7	200-OcCB	C197			
40186-71-8	201-OcCB		164	pg/g	9.52
2136-99-4	202-OcCB		714	pg/g	9.52
52663-76-0	203-OcCB		445	pg/g	9.52
74472-52-9	204-OcCB	U	9.52	pg/g	9.52
74472-53-0	205-OcCB	U	9.52	pg/g	9.52
40186-72-9	206-NoCB		159	pg/g	9.52
52663-79-3	207-NoCB		72.9	pg/g	9.52
52663-77-1	208-NoCB		241	pg/g	9.52
2051-24-3	209-DeCB		259	pg/g	9.52
1336-36-3	Total PCB Congeners		125000	pg/g	9.52

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1-MoCB		78.1	190	pg/g	41.0	(5%-145%)
13C-3-MoCB		92.9	190	pg/g	48.8	(5%-145%)
13C-4-DiCB		72.8	190	pg/g	38.2	(5%-145%)
13C-15-DiCB		140	190	pg/g	73.7	(5%-145%)
13C-19-TrCB		110	190	pg/g	57.8	(5%-145%)
13C-37-TrCB		184	190	pg/g	96.8	(5%-145%)
13C-54-TeCB		103	190	pg/g	54.0	(5%-145%)
13C-77-TeCB		179	190	pg/g	94.0	(10%-145%)
13C-81-TeCB		186	190	pg/g	97.8	(10%-145%)
13C-104-PeCB		97.5	190	pg/g	51.2	(10%-145%)
13C-105-PeCB		159	190	pg/g	83.7	(10%-145%)
13C-114-PeCB		161	190	pg/g	84.6	(10%-145%)
13C-118-PeCB		161	190	pg/g	84.4	(10%-145%)
13C-123-PeCB		159	190	pg/g	83.3	(10%-145%)
13C-126-PeCB		165	190	pg/g	86.6	(10%-145%)
13C-155-HxCB		108	190	pg/g	56.5	(10%-145%)
13C-156-HxCB	C	293	381	pg/g	76.9	(10%-145%)
13C-157-HxCB	C156L					
13C-167-HxCB		148	190	pg/g	77.8	(10%-145%)
13C-169-HxCB		154	190	pg/g	80.9	(10%-145%)
13C-188-HpCB		127	190	pg/g	66.5	(10%-145%)
13C-189-HpCB		152	190	pg/g	79.9	(10%-145%)

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446002**	**Date Collected:**	**01/13/2017 11:00**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-2**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**03/04/2017 12:41**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d03mar17a_3-4**			**Dilution:**	**5**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10.5 g**		

CAS No.	Parmname	Qual	Result	Units	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-202-OcCB		120	190	pg/g	63.0	(10%-145%)
13C-205-OcCB		162	190	pg/g	84.9	(10%-145%)
13C-206-NoCB		165	190	pg/g	86.8	(10%-145%)
13C-208-NoCB		132	190	pg/g	69.0	(10%-145%)
13C-209-DeCB		128	190	pg/g	67.5	(10%-145%)
13C-28-TrCB		139	190	pg/g	72.9	(5%-145%)
13C-111-PeCB		147	190	pg/g	77.4	(10%-145%)
13C-178-HpCB		132	190	pg/g	69.4	(10%-145%)

Comments:

C **Congener has coeluters. When Cxxx, refer to congener number xxx for data**

U **Analyte was analyzed for, but not detected above the specified detection limit.**

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446003**	**Date Collected:**	**01/13/2017 11:20**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-3**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**03/03/2017 19:12**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d03mar17a-8**			**Dilution:**	**10**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10.46 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
2051-60-7	1-MoCB	U	19.1	pg/g	19.1
2051-61-8	2-MoCB	U	19.1	pg/g	19.1
2051-62-9	3-MoCB	U	19.1	pg/g	19.1
13029-08-8	4-DiCB		30.7	pg/g	19.1
16605-91-7	5-DiCB	U	19.1	pg/g	19.1
25569-80-6	6-DiCB	U	19.1	pg/g	19.1
33284-50-3	7-DiCB	U	19.1	pg/g	19.1
34883-43-7	8-DiCB		30.6	pg/g	19.1
34883-39-1	9-DiCB	U	19.1	pg/g	19.1
33146-45-1	10-DiCB	U	19.1	pg/g	19.1
2050-67-1	11-DiCB	U	191	pg/g	191
2974-92-7	12-DiCB	CU	38.2	pg/g	38.2
2974-90-5	13-DiCB	C12			
34883-41-5	14-DiCB	U	19.1	pg/g	19.1
2050-68-2	15-DiCB	U	19.1	pg/g	19.1
38444-78-9	16-TrCB		35.5	pg/g	19.1
37680-66-3	17-TrCB		141	pg/g	19.1
37680-65-2	18-TrCB	C	123	pg/g	38.2
38444-73-4	19-TrCB	U	19.1	pg/g	19.1
38444-84-7	20-TrCB	C	1790	pg/g	38.2
55702-46-0	21-TrCB	C	66.8	pg/g	38.2
38444-85-8	22-TrCB		150	pg/g	19.1
55720-44-0	23-TrCB	U	19.1	pg/g	19.1
55702-45-9	24-TrCB	U	19.1	pg/g	19.1
55712-37-3	25-TrCB		32.7	pg/g	19.1
38444-81-4	26-TrCB	C	113	pg/g	38.2
38444-76-7	27-TrCB		27.3	pg/g	19.1
7012-37-5	28-TrCB	C20			
15862-07-4	29-TrCB	C26			
35693-92-6	30-TrCB	C18			
16606-02-3	31-TrCB		713	pg/g	19.1
38444-77-8	32-TrCB		200	pg/g	19.1

Comments:

C **Congener has coeluters. When Cxxx, refer to congener number xxx for data**

U **Analyte was analyzed for, but not detected above the specified detection limit.**

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446003**	**Date Collected:**	**01/13/2017 11:20**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-3**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**03/03/2017 19:12**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d03mar17a-8**			**Dilution:**	**10**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10.46 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
38444-86-9	33-TrCB	C21			
37680-68-5	34-TrCB	U	19.1	pg/g	19.1
37680-69-6	35-TrCB	U	19.1	pg/g	19.1
38444-87-0	36-TrCB	U	19.1	pg/g	19.1
38444-90-5	37-TrCB		27.4	pg/g	19.1
53555-66-1	38-TrCB	U	19.1	pg/g	19.1
38444-88-1	39-TrCB	U	19.1	pg/g	19.1
38444-93-8	40-TeCB	C	612	pg/g	38.2
52663-59-9	41-TeCB		51.6	pg/g	19.1
36559-22-5	42-TeCB		405	pg/g	19.1
70362-46-8	43-TeCB		74.7	pg/g	19.1
41464-39-5	44-TeCB	C	2380	pg/g	57.4
70362-45-7	45-TeCB	C	123	pg/g	38.2
41464-47-5	46-TeCB	U	19.1	pg/g	19.1
2437-79-8	47-TeCB	C44			
70362-47-9	48-TeCB		68.4	pg/g	19.1
41464-40-8	49-TeCB	C	2220	pg/g	38.2
62796-65-0	50-TeCB	C	119	pg/g	38.2
68194-04-7	51-TeCB	C45			
35693-99-3	52-TeCB		3370	pg/g	19.1
41464-41-9	53-TeCB	C50			
15968-05-5	54-TeCB	U	19.1	pg/g	19.1
74338-24-2	55-TeCB		59.1	pg/g	19.1
41464-43-1	56-TeCB		74.8	pg/g	19.1
70424-67-8	57-TeCB	U	19.1	pg/g	19.1
41464-49-7	58-TeCB	U	19.1	pg/g	19.1
74472-33-6	59-TeCB	C	239	pg/g	57.4
33025-41-1	60-TeCB		535	pg/g	19.1
33284-53-6	61-TeCB	C	3500	pg/g	76.5
54230-22-7	62-TeCB	C59			
74472-34-7	63-TeCB		175	pg/g	19.1
52663-58-8	64-TeCB		1310	pg/g	19.1

Comments:

C Congener has coeluters. When Cxxx, refer to congener number xxx for data

U Analyte was analyzed for, but not detected above the specified detection limit.

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446003**	**Date Collected:**	**01/13/2017 11:20**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-3**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**03/03/2017 19:12**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d03mar17a-8**			**Dilution:**	**10**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10.46 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
33284-54-7	65-TeCB	C44			
32598-10-0	66-TeCB		3570	pg/g	19.1
73575-53-8	67-TeCB	U	19.1	pg/g	19.1
73575-52-7	68-TeCB		71.4	pg/g	19.1
60233-24-1	69-TeCB	C49			
32598-11-1	70-TeCB	C61			
41464-46-4	71-TeCB	C40			
41464-42-0	72-TeCB		86.5	pg/g	19.1
74338-23-1	73-TeCB		57.1	pg/g	19.1
32690-93-0	74-TeCB	C61			
32598-12-2	75-TeCB	C59			
70362-48-0	76-TeCB	C61			
32598-13-3	77-TeCB		30.4	pg/g	19.1
70362-49-1	78-TeCB	U	19.1	pg/g	19.1
41464-48-6	79-TeCB		27.2	pg/g	19.1
33284-52-5	80-TeCB	U	19.1	pg/g	19.1
70362-50-4	81-TeCB	U	19.1	pg/g	19.1
52663-62-4	82-PeCB		50.2	pg/g	19.1
60145-20-2	83-PeCB		62.4	pg/g	19.1
52663-60-2	84-PeCB		97.5	pg/g	19.1
65510-45-4	85-PeCB	C	1260	pg/g	57.4
55312-69-1	86-PeCB	C	2400	pg/g	115
38380-02-8	87-PeCB	C86			
55215-17-3	88-PeCB	C	699	pg/g	38.2
73575-57-2	89-PeCB	U	19.1	pg/g	19.1
68194-07-0	90-PeCB	C	6460	pg/g	57.4
68194-05-8	91-PeCB	C88			
52663-61-3	92-PeCB		1460	pg/g	19.1
73575-56-1	93-PeCB	C	120	pg/g	38.2
73575-55-0	94-PeCB	U	19.1	pg/g	19.1
38379-99-6	95-PeCB		2490	pg/g	19.1
73575-54-9	96-PeCB	U	19.1	pg/g	19.1

Comments:

C Congener has coeluters. When Cxxx, refer to congener number xxx for data

U Analyte was analyzed for, but not detected above the specified detection limit.

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446003**	**Date Collected:**	**01/13/2017 11:20**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-3**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**03/03/2017 19:12**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d03mar17a-8**			**Dilution:**	**10**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10.46 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
41464-51-1	97-PeCB	C86			
60233-25-2	98-PeCB	C	135	pg/g	38.2
38380-01-7	99-PeCB		5780	pg/g	19.1
39485-83-1	100-PeCB	C93			
37680-73-2	101-PeCB	C90			
68194-06-9	102-PeCB	C98			
60145-21-3	103-PeCB		87.7	pg/g	19.1
56558-16-8	104-PeCB	U	19.1	pg/g	19.1
32598-14-4	105-PeCB		2020	pg/g	19.1
70424-69-0	106-PeCB	U	19.1	pg/g	19.1
70424-68-9	107-PeCB		601	pg/g	19.1
70362-41-3	108-PeCB	C	51.0	pg/g	38.2
74472-35-8	109-PeCB	C86			
38380-03-9	110-PeCB	C	6100	pg/g	38.2
39635-32-0	111-PeCB	U	19.1	pg/g	19.1
74472-36-9	112-PeCB		43.9	pg/g	19.1
68194-10-5	113-PeCB	C90			
74472-37-0	114-PeCB		96.3	pg/g	19.1
74472-38-1	115-PeCB	C110			
18259-05-7	116-PeCB	C85			
68194-11-6	117-PeCB	C85			
31508-00-6	118-PeCB		6910	pg/g	19.1
56558-17-9	119-PeCB	C86			
68194-12-7	120-PeCB		73.6	pg/g	19.1
56558-18-0	121-PeCB	U	19.1	pg/g	19.1
76842-07-4	122-PeCB	U	19.1	pg/g	19.1
65510-44-3	123-PeCB		89.3	pg/g	19.1
70424-70-3	124-PeCB	C108			
74472-39-2	125-PeCB	C86			
57465-28-8	126-PeCB	U	19.1	pg/g	19.1
39635-33-1	127-PeCB	U	19.1	pg/g	19.1
38380-07-3	128-HxCB	C	1000	pg/g	38.2

Comments:

C Congener has coeluters. When Cxxx, refer to congener number xxx for data

U Analyte was analyzed for, but not detected above the specified detection limit.

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446003**	**Date Collected:**	**01/13/2017 11:20**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-3**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**03/03/2017 19:12**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d03mar17a-8**			**Dilution:**	**10**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10.46 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
55215-18-4	129-HxCB	C	9700	pg/g	57.4
52663-66-8	130-HxCB		490	pg/g	19.1
61798-70-7	131-HxCB	U	19.1	pg/g	19.1
38380-05-1	132-HxCB		1060	pg/g	19.1
35694-04-3	133-HxCB		238	pg/g	19.1
52704-70-8	134-HxCB		50.6	pg/g	19.1
52744-13-5	135-HxCB	C	1970	pg/g	38.2
38411-22-2	136-HxCB		167	pg/g	19.1
35694-06-5	137-HxCB		287	pg/g	19.1
35065-28-2	138-HxCB	C129			
56030-56-9	139-HxCB	C	115	pg/g	38.2
59291-64-4	140-HxCB	C139			
52712-04-6	141-HxCB		557	pg/g	19.1
41411-61-4	142-HxCB	U	19.1	pg/g	19.1
68194-15-0	143-HxCB	U	19.1	pg/g	19.1
68194-14-9	144-HxCB		155	pg/g	19.1
74472-40-5	145-HxCB	U	19.1	pg/g	19.1
51908-16-8	146-HxCB		2130	pg/g	19.1
68194-13-8	147-HxCB	C	4550	pg/g	38.2
74472-41-6	148-HxCB		31.3	pg/g	19.1
38380-04-0	149-HxCB	C147			
68194-08-1	150-HxCB	U	19.1	pg/g	19.1
52663-63-5	151-HxCB	C135			
68194-09-2	152-HxCB	U	19.1	pg/g	19.1
35065-27-1	153-HxCB	C	11800	pg/g	38.2
60145-22-4	154-HxCB		267	pg/g	19.1
33979-03-2	155-HxCB		22.1	pg/g	19.1
38380-08-4	156-HxCB	C	589	pg/g	38.2
69782-90-7	157-HxCB	C156			
74472-42-7	158-HxCB		479	pg/g	19.1
39635-35-3	159-HxCB	U	19.1	pg/g	19.1
41411-62-5	160-HxCB	U	19.1	pg/g	19.1

Comments:

C Congener has coeluters. When Cxxx, refer to congener number xxx for data

U Analyte was analyzed for, but not detected above the specified detection limit.

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446003**	**Date Collected:**	**01/13/2017 11:20**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-3**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**03/03/2017 19:12**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d03mar17a-8**			**Dilution:**	**10**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10.46 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
74472-43-8	161-HxCB	U	19.1	pg/g	19.1
39635-34-2	162-HxCB		30.8	pg/g	19.1
74472-44-9	163-HxCB	C129			
74472-45-0	164-HxCB		334	pg/g	19.1
74472-46-1	165-HxCB	U	19.1	pg/g	19.1
41411-63-6	166-HxCB	C128			
52663-72-6	167-HxCB		389	pg/g	19.1
59291-65-5	168-HxCB	C153			
32774-16-6	169-HxCB	U	19.1	pg/g	19.1
35065-30-6	170-HpCB		1180	pg/g	19.1
52663-71-5	171-HpCB	C	362	pg/g	38.2
52663-74-8	172-HpCB		188	pg/g	19.1
68194-16-1	173-HpCB	C171			
38411-25-5	174-HpCB		711	pg/g	19.1
40186-70-7	175-HpCB		61.7	pg/g	19.1
52663-65-7	176-HpCB		81.2	pg/g	19.1
52663-70-4	177-HpCB		1130	pg/g	19.1
52663-67-9	178-HpCB		654	pg/g	19.1
52663-64-6	179-HpCB		192	pg/g	19.1
35065-29-3	180-HpCB	C	3710	pg/g	38.2
74472-47-2	181-HpCB	U	19.1	pg/g	19.1
60145-23-5	182-HpCB	U	19.1	pg/g	19.1
52663-69-1	183-HpCB	C	1110	pg/g	38.2
74472-48-3	184-HpCB	U	19.1	pg/g	19.1
52712-05-7	185-HpCB	C183			
74472-49-4	186-HpCB	U	19.1	pg/g	19.1
52663-68-0	187-HpCB		4800	pg/g	19.1
74487-85-7	188-HpCB		20.6	pg/g	19.1
39635-31-9	189-HpCB		26.5	pg/g	19.1
41411-64-7	190-HpCB		138	pg/g	19.1
74472-50-7	191-HpCB		48.8	pg/g	19.1
74472-51-8	192-HpCB	U	19.1	pg/g	19.1

Comments:

C Congener has coeluters. When Cxxx, refer to congener number xxx for data

U Analyte was analyzed for, but not detected above the specified detection limit.

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446003**	**Date Collected:**	**01/13/2017 11:20**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-3**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**03/03/2017 19:12**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d03mar17a-8**			**Dilution:**	**10**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10.46 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
69782-91-8	193-HpCB	C180			
35694-08-7	194-OcCB		360	pg/g	19.1
52663-78-2	195-OcCB		217	pg/g	19.1
42740-50-1	196-OcCB		458	pg/g	19.1
33091-17-7	197-OcCB	C	88.4	pg/g	38.2
68194-17-2	198-OcCB	C	1280	pg/g	38.2
52663-75-9	199-OcCB	C198			
52663-73-7	200-OcCB	C197			
40186-71-8	201-OcCB		180	pg/g	19.1
2136-99-4	202-OcCB		669	pg/g	19.1
52663-76-0	203-OcCB		421	pg/g	19.1
74472-52-9	204-OcCB	U	19.1	pg/g	19.1
74472-53-0	205-OcCB	U	19.1	pg/g	19.1
40186-72-9	206-NoCB		151	pg/g	19.1
52663-79-3	207-NoCB		73.5	pg/g	19.1
52663-77-1	208-NoCB		233	pg/g	19.1
2051-24-3	209-DeCB		247	pg/g	19.1
1336-36-3	Total PCB Congeners		115000	pg/g	19.1

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1-MoCB		90.3	191	pg/g	47.2	(5%-145%)
13C-3-MoCB		105	191	pg/g	55.2	(5%-145%)
13C-4-DiCB		80.1	191	pg/g	41.9	(5%-145%)
13C-15-DiCB		143	191	pg/g	74.9	(5%-145%)
13C-19-TrCB		119	191	pg/g	62.4	(5%-145%)
13C-37-TrCB		173	191	pg/g	90.6	(5%-145%)
13C-54-TeCB		118	191	pg/g	61.9	(5%-145%)
13C-77-TeCB		173	191	pg/g	90.3	(10%-145%)
13C-81-TeCB		178	191	pg/g	93.0	(10%-145%)
13C-104-PeCB		105	191	pg/g	54.7	(10%-145%)
13C-105-PeCB		151	191	pg/g	79.2	(10%-145%)
13C-114-PeCB		149	191	pg/g	77.7	(10%-145%)
13C-118-PeCB		157	191	pg/g	82.0	(10%-145%)
13C-123-PeCB		153	191	pg/g	79.9	(10%-145%)
13C-126-PeCB		153	191	pg/g	80.1	(10%-145%)
13C-155-HxCB		118	191	pg/g	61.9	(10%-145%)
13C-156-HxCB	C	284	382	pg/g	74.3	(10%-145%)
13C-157-HxCB	C156L					
13C-167-HxCB		151	191	pg/g	78.9	(10%-145%)
13C-169-HxCB		152	191	pg/g	79.7	(10%-145%)
13C-188-HpCB		173	191	pg/g	90.7	(10%-145%)
13C-189-HpCB		187	191	pg/g	98.0	(10%-145%)

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**10446003**	**Date Collected:**	**01/13/2017 11:20**	**Matrix:**	**TISSUE**
Client Sample:	**1613/1668C Tissue**	**Date Received:**	**02/11/2017 09:49**		
Client ID:	**WC-FISH-3**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**03/03/2017 19:12**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d03mar17a-8**			**Dilution:**	**10**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10.46 g**		

CAS No.	Parmname	Qual	Result	Units	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-202-OcCB		156	191	pg/g	81.8	(10%-145%)
13C-205-OcCB		162	191	pg/g	84.5	(10%-145%)
13C-206-NoCB		194	191	pg/g	101	(10%-145%)
13C-208-NoCB		156	191	pg/g	81.7	(10%-145%)
13C-209-DeCB		149	191	pg/g	78.2	(10%-145%)
13C-28-TrCB		158	191	pg/g	82.8	(5%-145%)
13C-111-PeCB		143	191	pg/g	74.6	(10%-145%)
13C-178-HpCB		132	191	pg/g	69.2	(10%-145%)

Comments:

C **Congener has coeluters. When Cxxx, refer to congener number xxx for data**

U **Analyte was analyzed for, but not detected above the specified detection limit.**

Quality Control Summary

PCB Congeners

Surrogate Recovery Report

SDG Number: L1701310

Matrix Type: TISSUE

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
12018130	LCS for batch 34094	13C-1-MoCB		55.2	(15%-145%)
		13C-3-MoCB		62.4	(15%-145%)
		13C-4-DiCB		61.9	(15%-145%)
		13C-15-DiCB		106	(15%-145%)
		13C-19-TrCB		76.2	(15%-145%)
		13C-37-TrCB		101	(15%-145%)
		13C-54-TeCB		69.2	(15%-145%)
		13C-77-TeCB		130	(40%-145%)
		13C-81-TeCB		131	(40%-145%)
		13C-104-PeCB		78.8	(40%-145%)
		13C-105-PeCB		118	(40%-145%)
		13C-114-PeCB		115	(40%-145%)
		13C-118-PeCB		116	(40%-145%)
		13C-123-PeCB		119	(40%-145%)
		13C-126-PeCB		123	(40%-145%)
		13C-155-HxCB		81.8	(40%-145%)
		13C-156-HxCB	C	104	(40%-145%)
		13C-157-HxCB	C156L		
		13C-167-HxCB		107	(40%-145%)
		13C-169-HxCB		111	(40%-145%)
		13C-188-HpCB		79.4	(40%-145%)
		13C-189-HpCB		99.5	(40%-145%)
		13C-202-OcCB		84.3	(40%-145%)
		13C-205-OcCB		109	(40%-145%)
		13C-206-NoCB		99.4	(40%-145%)
		13C-208-NoCB		91.4	(40%-145%)
		13C-209-DeCB		124	(40%-145%)
		13C-28-TrCB		76.6	(15%-145%)
		13C-111-PeCB		100	(40%-145%)
		13C-178-HpCB		102	(40%-145%)
12018131	LCSD for batch 34094	13C-1-MoCB		46.3	(15%-145%)
		13C-3-MoCB		49.3	(15%-145%)
		13C-4-DiCB		50.3	(15%-145%)
		13C-15-DiCB		88.7	(15%-145%)
		13C-19-TrCB		63.0	(15%-145%)
		13C-37-TrCB		80.1	(15%-145%)
		13C-54-TeCB		51.4	(15%-145%)
		13C-77-TeCB		106	(40%-145%)
		13C-81-TeCB		108	(40%-145%)
		13C-104-PeCB		60.2	(40%-145%)
		13C-105-PeCB		91.8	(40%-145%)
		13C-114-PeCB		91.6	(40%-145%)
		13C-118-PeCB		91.3	(40%-145%)
		13C-123-PeCB		94.3	(40%-145%)
		13C-126-PeCB		95.6	(40%-145%)
		13C-155-HxCB		67.8	(40%-145%)
		13C-156-HxCB	C	83.7	(40%-145%)
		13C-157-HxCB	C156L		
		13C-167-HxCB		85.4	(40%-145%)
		13C-169-HxCB		89.3	(40%-145%)
		13C-188-HpCB		58.7	(40%-145%)
		13C-189-HpCB		73.0	(40%-145%)

PCB Congeners

Surrogate Recovery Report

SDG Number: L1701310

Matrix Type: TISSUE

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)		Acceptance Limits
12018131	LCSD for batch 34094	13C-202-OcCB		61.4		(40%-145%)
		13C-205-OcCB		82.7		(40%-145%)
		13C-206-NoCB		71.4		(40%-145%)
		13C-208-NoCB		66.5		(40%-145%)
		13C-209-DeCB		90.2		(40%-145%)
		13C-28-TrCB		58.3		(15%-145%)
		13C-111-PeCB		77.1		(40%-145%)
		13C-178-HpCB		80.4		(40%-145%)
12018129	MB for batch 34094	13C-1-MoCB		52.4		(5%-145%)
		13C-3-MoCB		54.5		(5%-145%)
		13C-4-DiCB		55.3		(5%-145%)
		13C-15-DiCB		108		(5%-145%)
		13C-19-TrCB		71.1		(5%-145%)
		13C-37-TrCB		94.2		(5%-145%)
		13C-54-TeCB		58.8		(5%-145%)
		13C-77-TeCB		119		(10%-145%)
		13C-81-TeCB		119		(10%-145%)
		13C-104-PeCB		73.3		(10%-145%)
		13C-105-PeCB		106		(10%-145%)
		13C-114-PeCB		103		(10%-145%)
		13C-118-PeCB		104		(10%-145%)
		13C-123-PeCB		107		(10%-145%)
		13C-126-PeCB		113		(10%-145%)
		13C-155-HxCB		76.7		(10%-145%)
		13C-156-HxCB	C	98.5		(10%-145%)
		13C-157-HxCB	C156L			
		13C-167-HxCB		100		(10%-145%)
		13C-169-HxCB		107		(10%-145%)
		13C-188-HpCB		63.7		(10%-145%)
		13C-189-HpCB		85.1		(10%-145%)
		13C-202-OcCB		68.5		(10%-145%)
		13C-205-OcCB		94.8		(10%-145%)
		13C-206-NoCB		82.4		(10%-145%)
		13C-208-NoCB		76.7		(10%-145%)
		13C-209-DeCB		102		(10%-145%)
		13C-28-TrCB		68.5		(5%-145%)
		13C-111-PeCB		91.6		(10%-145%)
		13C-178-HpCB		93.5		(10%-145%)
10446003	WC-FISH-3	13C-1-MoCB		47.2	D	(5%-145%)
		13C-3-MoCB		55.2	D	(5%-145%)
		13C-4-DiCB		41.9	D	(5%-145%)
		13C-15-DiCB		74.9	D	(5%-145%)
		13C-19-TrCB		62.4	D	(5%-145%)
		13C-37-TrCB		90.6	D	(5%-145%)
		13C-54-TeCB		61.9	D	(5%-145%)
		13C-77-TeCB		90.3	D	(10%-145%)
		13C-81-TeCB		93.0	D	(10%-145%)
		13C-104-PeCB		54.7	D	(10%-145%)
		13C-105-PeCB		79.2	D	(10%-145%)
		13C-114-PeCB		77.7	D	(10%-145%)
		13C-118-PeCB		82.0	D	(10%-145%)

PCB Congeners

Surrogate Recovery Report

SDG Number: L1701310

Matrix Type: TISSUE

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)		Acceptance Limits
10446003	WC-FISH-3	13C-123-PeCB		79.9	D	(10%-145%)
		13C-126-PeCB		80.1	D	(10%-145%)
		13C-155-HxCB		61.9	D	(10%-145%)
		13C-156-HxCB	C	74.3	D	(10%-145%)
		13C-157-HxCB	C156L			
		13C-167-HxCB		78.9	D	(10%-145%)
		13C-169-HxCB		79.7	D	(10%-145%)
		13C-188-HpCB		90.7	D	(10%-145%)
		13C-189-HpCB		98.0	D	(10%-145%)
		13C-202-OcCB		81.8	D	(10%-145%)
		13C-205-OcCB		84.5	D	(10%-145%)
		13C-206-NoCB		101	D	(10%-145%)
		13C-208-NoCB		81.7	D	(10%-145%)
		13C-209-DeCB		78.2	D	(10%-145%)
		13C-28-TrCB		82.8	D	(5%-145%)
		13C-111-PeCB		74.6	D	(10%-145%)
		13C-178-HpCB		69.2	D	(10%-145%)
10446001	WC-FISH-1	13C-1-MoCB		48.9	D	(5%-145%)
		13C-3-MoCB		53.7	D	(5%-145%)
		13C-4-DiCB		44.5	D	(5%-145%)
		13C-15-DiCB		83.3	D	(5%-145%)
		13C-19-TrCB		70.5	D	(5%-145%)
		13C-37-TrCB		106	D	(5%-145%)
		13C-54-TeCB		58.8	D	(5%-145%)
		13C-77-TeCB		114	D	(10%-145%)
		13C-81-TeCB		116	D	(10%-145%)
		13C-104-PeCB		51.9	D	(10%-145%)
		13C-105-PeCB		94.3	D	(10%-145%)
		13C-114-PeCB		92.7	D	(10%-145%)
		13C-118-PeCB		93.7	D	(10%-145%)
		13C-123-PeCB		97.9	D	(10%-145%)
		13C-126-PeCB		93.2	D	(10%-145%)
		13C-155-HxCB		60.2	D	(10%-145%)
		13C-156-HxCB	C	83.7	D	(10%-145%)
		13C-157-HxCB	C156L			
		13C-167-HxCB		84.6	D	(10%-145%)
		13C-169-HxCB		87.4	D	(10%-145%)
		13C-188-HpCB		85.2	D	(10%-145%)
		13C-189-HpCB		98.9	D	(10%-145%)
		13C-202-OcCB		80.5	D	(10%-145%)
		13C-205-OcCB		95.4	D	(10%-145%)
		13C-206-NoCB		112	D	(10%-145%)
		13C-208-NoCB		82.8	D	(10%-145%)
		13C-209-DeCB		84.8	D	(10%-145%)
		13C-28-TrCB		88.1	D	(5%-145%)
		13C-111-PeCB		83.8	D	(10%-145%)
		13C-178-HpCB		71.5	D	(10%-145%)
10446002	WC-FISH-2	13C-1-MoCB		41.0	D	(5%-145%)
		13C-3-MoCB		48.8	D	(5%-145%)
		13C-4-DiCB		38.2	D	(5%-145%)
		13C-15-DiCB		73.7	D	(5%-145%)

PCB Congeners

Surrogate Recovery Report

SDG Number: L1701310

Matrix Type: TISSUE

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)		Acceptance Limits
10446002	WC-FISH-2	13C-19-TrCB		57.8	D	(5%-145%)
		13C-37-TrCB		96.8	D	(5%-145%)
		13C-54-TeCB		54.0	D	(5%-145%)
		13C-77-TeCB		94.0	D	(10%-145%)
		13C-81-TeCB		97.8	D	(10%-145%)
		13C-104-PeCB		51.2	D	(10%-145%)
		13C-105-PeCB		83.7	D	(10%-145%)
		13C-114-PeCB		84.6	D	(10%-145%)
		13C-118-PeCB		84.4	D	(10%-145%)
		13C-123-PeCB		83.3	D	(10%-145%)
		13C-126-PeCB		86.6	D	(10%-145%)
		13C-155-HxCB		56.5	D	(10%-145%)
		13C-156-HxCB	C	76.9	D	(10%-145%)
		13C-157-HxCB	C156L			
		13C-167-HxCB		77.8	D	(10%-145%)
		13C-169-HxCB		80.9	D	(10%-145%)
		13C-188-HpCB		66.5	D	(10%-145%)
		13C-189-HpCB		79.9	D	(10%-145%)
		13C-202-OcCB		63.0	D	(10%-145%)
		13C-205-OcCB		84.9	D	(10%-145%)
		13C-206-NoCB		86.8	D	(10%-145%)
		13C-208-NoCB		69.0	D	(10%-145%)
		13C-209-DeCB		67.5	D	(10%-145%)
		13C-28-TrCB		72.9	D	(5%-145%)
		13C-111-PeCB		77.4	D	(10%-145%)
		13C-178-HpCB		69.4	D	(10%-145%)

* Recovery outside Acceptance Limits

Column to be used to flag recovery values

D Sample Diluted

PCB Congeners

Quality Control Summary
Spike Recovery Report

SDG Number: L1701310 **Sample Type:** Laboratory Control Sample

Client ID: LCS for batch 34094 **Matrix:** TISSUE

Lab Sample ID: 12018130

Instrument: HRP875 **Analysis Date:** 02/28/2017 05:11 **Dilution:** 1

Analyst: MJC **Prep Batch ID:** 34094

Batch ID: 34096

CAS No.		Parmname	Amount Added pg/g		Spike Conc. pg/g	Recovery %	Acceptance Limits
2051-60-7	LCS	1-MoCB	50.0		56.5	113	60-135
2051-62-9	LCS	3-MoCB	50.0		62.1	124	60-135
13029-08-8	LCS	4-DiCB	50.0		48.6	97.2	60-135
2050-68-2	LCS	15-DiCB	50.0		64.1	128	60-135
38444-73-4	LCS	19-TrCB	50.0		53.2	106	60-135
38444-90-5	LCS	37-TrCB	50.0		51.2	102	60-135
15968-05-5	LCS	54-TeCB	100		110	110	60-135
32598-13-3	LCS	77-TeCB	100		105	105	60-135
70362-50-4	LCS	81-TeCB	100		120	120	60-135
56558-16-8	LCS	104-PeCB	100		128	128	60-135
32598-14-4	LCS	105-PeCB	100		123	123	60-135
74472-37-0	LCS	114-PeCB	100		116	116	60-135
31508-00-6	LCS	118-PeCB	100		107	107	60-135
65510-44-3	LCS	123-PeCB	100		103	103	60-135
57465-28-8	LCS	126-PeCB	100		122	122	60-135
33979-03-2	LCS	155-HxCB	100		104	104	60-135
38380-08-4	LCS	156-HxCB	200	C	239	120	60-135
69782-90-7	LCS	157-HxCB		C156			
52663-72-6	LCS	167-HxCB	100		125	125	60-135
32774-16-6	LCS	169-HxCB	100		117	117	60-135
74487-85-7	LCS	188-HpCB	100		104	104	60-135
39635-31-9	LCS	189-HpCB	100		109	109	60-135
2136-99-4	LCS	202-OcCB	150		148	98.4	60-135
74472-53-0	LCS	205-OcCB	150		154	103	60-135
40186-72-9	LCS	206-NoCB	150		154	103	60-135
52663-77-1	LCS	208-NoCB	150		164	110	60-135
2051-24-3	LCS	209-DeCB	150		145	96.6	60-135

PCB Congeners

Quality Control Summary
Spike Recovery Report

SDG Number: L1701310 **Sample Type:** Laboratory Control Sample Duplicate

Client ID: LCSD for batch 34094 **Matrix:** TISSUE

Lab Sample ID: 12018131

Instrument: HRP875 **Analysis Date:** 02/28/2017 06:20 **Dilution:** 1

Analyst: MJC **Prep Batch ID:** 34094

Batch ID: 34096

CAS No.		Parmname	Amount Added pg/g		Spike Conc. pg/g	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
2051-60-7	LCSD	1-MoCB	50.0		57.3	115	60-135	1.32	0-30
2051-62-9	LCSD	3-MoCB	50.0		64.5	129	60-135	3.75	0-30
13029-08-8	LCSD	4-DiCB	50.0		48.0	96	60-135	1.24	0-30
2050-68-2	LCSD	15-DiCB	50.0		64.3	129	60-135	0.399	0-30
38444-73-4	LCSD	19-TrCB	50.0		52.1	104	60-135	2.02	0-30
38444-90-5	LCSD	37-TrCB	50.0		53.2	106	60-135	3.81	0-30
15968-05-5	LCSD	54-TeCB	100		112	112	60-135	1.97	0-30
32598-13-3	LCSD	77-TeCB	100		106	106	60-135	0.562	0-30
70362-50-4	LCSD	81-TeCB	100		120	120	60-135	0.396	0-30
56558-16-8	LCSD	104-PeCB	100		130	130	60-135	1.53	0-30
32598-14-4	LCSD	105-PeCB	100		125	125	60-135	1.25	0-30
74472-37-0	LCSD	114-PeCB	100		117	117	60-135	0.879	0-30
31508-00-6	LCSD	118-PeCB	100		106	106	60-135	1.11	0-30
65510-44-3	LCSD	123-PeCB	100		101	101	60-135	1.80	0-30
57465-28-8	LCSD	126-PeCB	100		121	121	60-135	1.05	0-30
33979-03-2	LCSD	155-HxCB	100		103	103	60-135	1.02	0-30
38380-08-4	LCSD	156-HxCB	200	C	237	118	60-135	0.941	0-30
69782-90-7	LCSD	157-HxCB		C156					
52663-72-6	LCSD	167-HxCB	100		124	124	60-135	0.297	0-30
32774-16-6	LCSD	169-HxCB	100		118	118	60-135	0.284	0-30
74487-85-7	LCSD	188-HpCB	100		105	105	60-135	0.553	0-30
39635-31-9	LCSD	189-HpCB	100		109	109	60-135	0.425	0-30
2136-99-4	LCSD	202-OcCB	150		150	99.8	60-135	1.49	0-30
74472-53-0	LCSD	205-OcCB	150		154	103	60-135	0.347	0-30
40186-72-9	LCSD	206-NoCB	150		155	103	60-135	0.260	0-30
52663-77-1	LCSD	208-NoCB	150		165	110	60-135	0.599	0-30
2051-24-3	LCSD	209-DeCB	150		146	97.3	60-135	0.671	0-30

Method Blank Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Matrix:**	**TISSUE**
Client ID:	**MB for batch 34094**	**Instrument ID:**	**HRP875**	**Data File:**	**d27feb17a_2-4**
Lab Sample ID:	**12018129**	**Prep Date:**	**26-FEB-17**	**Analyzed:**	**02/28/17 07:28**
Column:					

This method blank applies to the following samples and quality control samples:

	Client Sample ID	Lab Sample ID	File ID	Date Analyzed	Time Analyzed
01	LCS for batch 34094	12018130	d27feb17a_2-2	02/28/17	0511
02	LCSD for batch 34094	12018131	d27feb17a_2-3	02/28/17	0620
03	WC-FISH-3	10446003	d03mar17a-8	03/03/17	1912
04	WC-FISH-1	10446001	d03mar17a_3-3	03/04/17	1132
05	WC-FISH-2	10446002	d03mar17a_3-4	03/04/17	1241

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**12018129**			**Matrix:**	**TISSUE**
Client Sample:	**QC for batch 34094**				
Client ID:	**MB for batch 34094**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**02/28/2017 07:28**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d27feb17a_2-4**			**Dilution:**	**1**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
2051-60-7	1-MoCB	U	2	pg/g	2.00
2051-61-8	2-MoCB	U	2	pg/g	2.00
2051-62-9	3-MoCB	U	2	pg/g	2.00
13029-08-8	4-DiCB	U	2	pg/g	2.00
16605-91-7	5-DiCB	U	2	pg/g	2.00
25569-80-6	6-DiCB	U	2	pg/g	2.00
33284-50-3	7-DiCB	U	2	pg/g	2.00
34883-43-7	8-DiCB	U	2	pg/g	2.00
34883-39-1	9-DiCB	U	2	pg/g	2.00
33146-45-1	10-DiCB	U	2	pg/g	2.00
2050-67-1	11-DiCB	U	20	pg/g	20.0
2974-92-7	12-DiCB	CU	4	pg/g	4.00
2974-90-5	13-DiCB	C12			
34883-41-5	14-DiCB	U	2	pg/g	2.00
2050-68-2	15-DiCB	U	2	pg/g	2.00
38444-78-9	16-TrCB	U	2	pg/g	2.00
37680-66-3	17-TrCB	U	2	pg/g	2.00
37680-65-2	18-TrCB	CU	4	pg/g	4.00
38444-73-4	19-TrCB	U	2	pg/g	2.00
38444-84-7	20-TrCB	CU	4	pg/g	4.00
55702-46-0	21-TrCB	CU	4	pg/g	4.00
38444-85-8	22-TrCB	U	2	pg/g	2.00
55720-44-0	23-TrCB	U	2	pg/g	2.00
55702-45-9	24-TrCB	U	2	pg/g	2.00
55712-37-3	25-TrCB	U	2	pg/g	2.00
38444-81-4	26-TrCB	CU	4	pg/g	4.00
38444-76-7	27-TrCB	U	2	pg/g	2.00
7012-37-5	28-TrCB	C20			
15862-07-4	29-TrCB	C26			
35693-92-6	30-TrCB	C18			
16606-02-3	31-TrCB	U	2	pg/g	2.00
38444-77-8	32-TrCB	U	2	pg/g	2.00

Comments:

C Congener has coeluters. When Cxxx, refer to congener number xxx for data

U Analyte was analyzed for, but not detected above the specified detection limit.

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**12018129**			**Matrix:**	**TISSUE**
Client Sample:	**QC for batch 34094**				
Client ID:	**MB for batch 34094**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**02/28/2017 07:28**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d27feb17a_2-4**			**Dilution:**	**1**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
38444-86-9	33-TrCB	C21			
37680-68-5	34-TrCB	U	2	pg/g	2.00
37680-69-6	35-TrCB	U	2	pg/g	2.00
38444-87-0	36-TrCB	U	2	pg/g	2.00
38444-90-5	37-TrCB	U	2	pg/g	2.00
53555-66-1	38-TrCB	U	2	pg/g	2.00
38444-88-1	39-TrCB	U	2	pg/g	2.00
38444-93-8	40-TeCB	CU	4	pg/g	4.00
52663-59-9	41-TeCB	U	2	pg/g	2.00
36559-22-5	42-TeCB	U	2	pg/g	2.00
70362-46-8	43-TeCB	U	2	pg/g	2.00
41464-39-5	44-TeCB	CU	6	pg/g	6.00
70362-45-7	45-TeCB	CU	4	pg/g	4.00
41464-47-5	46-TeCB	U	2	pg/g	2.00
2437-79-8	47-TeCB	C44			
70362-47-9	48-TeCB	U	2	pg/g	2.00
41464-40-8	49-TeCB	CU	4	pg/g	4.00
62796-65-0	50-TeCB	CU	4	pg/g	4.00
68194-04-7	51-TeCB	C45			
35693-99-3	52-TeCB	U	2	pg/g	2.00
41464-41-9	53-TeCB	C50			
15968-05-5	54-TeCB	U	2	pg/g	2.00
74338-24-2	55-TeCB	U	2	pg/g	2.00
41464-43-1	56-TeCB	U	2	pg/g	2.00
70424-67-8	57-TeCB	U	2	pg/g	2.00
41464-49-7	58-TeCB	U	2	pg/g	2.00
74472-33-6	59-TeCB	CU	6	pg/g	6.00
33025-41-1	60-TeCB	U	2	pg/g	2.00
33284-53-6	61-TeCB	CU	8	pg/g	8.00
54230-22-7	62-TeCB	C59			
74472-34-7	63-TeCB	U	2	pg/g	2.00
52663-58-8	64-TeCB	U	2	pg/g	2.00

Comments:

C **Congener has coeluters. When Cxxx, refer to congener number xxx for data**

U **Analyte was analyzed for, but not detected above the specified detection limit.**

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**12018129**			**Matrix:**	**TISSUE**
Client Sample:	**QC for batch 34094**				
Client ID:	**MB for batch 34094**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**02/28/2017 07:28**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d27feb17a_2-4**			**Dilution:**	**1**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
33284-54-7	65-TeCB	C44			
32598-10-0	66-TeCB	U	2	pg/g	2.00
73575-53-8	67-TeCB	U	2	pg/g	2.00
73575-52-7	68-TeCB	U	2	pg/g	2.00
60233-24-1	69-TeCB	C49			
32598-11-1	70-TeCB	C61			
41464-46-4	71-TeCB	C40			
41464-42-0	72-TeCB	U	2	pg/g	2.00
74338-23-1	73-TeCB	U	2	pg/g	2.00
32690-93-0	74-TeCB	C61			
32598-12-2	75-TeCB	C59			
70362-48-0	76-TeCB	C61			
32598-13-3	77-TeCB	U	2	pg/g	2.00
70362-49-1	78-TeCB	U	2	pg/g	2.00
41464-48-6	79-TeCB	U	2	pg/g	2.00
33284-52-5	80-TeCB	U	2	pg/g	2.00
70362-50-4	81-TeCB	U	2	pg/g	2.00
52663-62-4	82-PeCB	U	2	pg/g	2.00
60145-20-2	83-PeCB	U	2	pg/g	2.00
52663-60-2	84-PeCB	U	2	pg/g	2.00
65510-45-4	85-PeCB	CU	6	pg/g	6.00
55312-69-1	86-PeCB	CU	12	pg/g	12.0
38380-02-8	87-PeCB	C86			
55215-17-3	88-PeCB	CU	4	pg/g	4.00
73575-57-2	89-PeCB	U	2	pg/g	2.00
68194-07-0	90-PeCB	CU	6	pg/g	6.00
68194-05-8	91-PeCB	C88			
52663-61-3	92-PeCB	U	2	pg/g	2.00
73575-56-1	93-PeCB	CU	4	pg/g	4.00
73575-55-0	94-PeCB	U	2	pg/g	2.00
38379-99-6	95-PeCB	U	2	pg/g	2.00
73575-54-9	96-PeCB	U	2	pg/g	2.00

Comments:

C **Congener has coeluters. When Cxxx, refer to congener number xxx for data**

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PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**12018129**			**Matrix:**	**TISSUE**
Client Sample:	**QC for batch 34094**				
Client ID:	**MB for batch 34094**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**02/28/2017 07:28**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d27feb17a_2-4**			**Dilution:**	**1**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
41464-51-1	97-PeCB	C86			
60233-25-2	98-PeCB	CU	4	pg/g	4.00
38380-01-7	99-PeCB	U	2	pg/g	2.00
39485-83-1	100-PeCB	C93			
37680-73-2	101-PeCB	C90			
68194-06-9	102-PeCB	C98			
60145-21-3	103-PeCB	U	2	pg/g	2.00
56558-16-8	104-PeCB	U	2	pg/g	2.00
32598-14-4	105-PeCB	U	2	pg/g	2.00
70424-69-0	106-PeCB	U	2	pg/g	2.00
70424-68-9	107-PeCB	U	2	pg/g	2.00
70362-41-3	108-PeCB	CU	4	pg/g	4.00
74472-35-8	109-PeCB	C86			
38380-03-9	110-PeCB	CU	4	pg/g	4.00
39635-32-0	111-PeCB	U	2	pg/g	2.00
74472-36-9	112-PeCB	U	2	pg/g	2.00
68194-10-5	113-PeCB	C90			
74472-37-0	114-PeCB	U	2	pg/g	2.00
74472-38-1	115-PeCB	C110			
18259-05-7	116-PeCB	C85			
68194-11-6	117-PeCB	C85			
31508-00-6	118-PeCB	U	2	pg/g	2.00
56558-17-9	119-PeCB	C86			
68194-12-7	120-PeCB	U	2	pg/g	2.00
56558-18-0	121-PeCB	U	2	pg/g	2.00
76842-07-4	122-PeCB	U	2	pg/g	2.00
65510-44-3	123-PeCB	U	2	pg/g	2.00
70424-70-3	124-PeCB	C108			
74472-39-2	125-PeCB	C86			
57465-28-8	126-PeCB	U	2	pg/g	2.00
39635-33-1	127-PeCB	U	2	pg/g	2.00
38380-07-3	128-HxCB	CU	4	pg/g	4.00

Comments:

C Congener has coeluters. When Cxxx, refer to congener number xxx for data

U Analyte was analyzed for, but not detected above the specified detection limit.

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**12018129**			**Matrix:**	**TISSUE**
Client Sample:	**QC for batch 34094**				
Client ID:	**MB for batch 34094**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**02/28/2017 07:28**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d27feb17a_2-4**			**Dilution:**	**1**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
55215-18-4	129-HxCB	CU	6	pg/g	6.00
52663-66-8	130-HxCB	U	2	pg/g	2.00
61798-70-7	131-HxCB	U	2	pg/g	2.00
38380-05-1	132-HxCB	U	2	pg/g	2.00
35694-04-3	133-HxCB	U	2	pg/g	2.00
52704-70-8	134-HxCB	U	2	pg/g	2.00
52744-13-5	135-HxCB	CU	4	pg/g	4.00
38411-22-2	136-HxCB	U	2	pg/g	2.00
35694-06-5	137-HxCB	U	2	pg/g	2.00
35065-28-2	138-HxCB	C129			
56030-56-9	139-HxCB	CU	4	pg/g	4.00
59291-64-4	140-HxCB	C139			
52712-04-6	141-HxCB	U	2	pg/g	2.00
41411-61-4	142-HxCB	U	2	pg/g	2.00
68194-15-0	143-HxCB	U	2	pg/g	2.00
68194-14-9	144-HxCB	U	2	pg/g	2.00
74472-40-5	145-HxCB	U	2	pg/g	2.00
51908-16-8	146-HxCB	U	2	pg/g	2.00
68194-13-8	147-HxCB	CU	4	pg/g	4.00
74472-41-6	148-HxCB	U	2	pg/g	2.00
38380-04-0	149-HxCB	C147			
68194-08-1	150-HxCB	U	2	pg/g	2.00
52663-63-5	151-HxCB	C135			
68194-09-2	152-HxCB	U	2	pg/g	2.00
35065-27-1	153-HxCB	CU	4	pg/g	4.00
60145-22-4	154-HxCB	U	2	pg/g	2.00
33979-03-2	155-HxCB	U	2	pg/g	2.00
38380-08-4	156-HxCB	CU	4	pg/g	4.00
69782-90-7	157-HxCB	C156			
74472-42-7	158-HxCB	U	2	pg/g	2.00
39635-35-3	159-HxCB	U	2	pg/g	2.00
41411-62-5	160-HxCB	U	2	pg/g	2.00

Comments:

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PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**12018129**			**Matrix:**	**TISSUE**
Client Sample:	**QC for batch 34094**				
Client ID:	**MB for batch 34094**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**02/28/2017 07:28**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d27feb17a_2-4**			**Dilution:**	**1**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
74472-43-8	161-HxCB	U	2	pg/g	2.00
39635-34-2	162-HxCB	U	2	pg/g	2.00
74472-44-9	163-HxCB	C129			
74472-45-0	164-HxCB	U	2	pg/g	2.00
74472-46-1	165-HxCB	U	2	pg/g	2.00
41411-63-6	166-HxCB	C128			
52663-72-6	167-HxCB	U	2	pg/g	2.00
59291-65-5	168-HxCB	C153			
32774-16-6	169-HxCB	U	2	pg/g	2.00
35065-30-6	170-HpCB	U	2	pg/g	2.00
52663-71-5	171-HpCB	CU	4	pg/g	4.00
52663-74-8	172-HpCB	U	2	pg/g	2.00
68194-16-1	173-HpCB	C171			
38411-25-5	174-HpCB	U	2	pg/g	2.00
40186-70-7	175-HpCB	U	2	pg/g	2.00
52663-65-7	176-HpCB	U	2	pg/g	2.00
52663-70-4	177-HpCB	U	2	pg/g	2.00
52663-67-9	178-HpCB	U	2	pg/g	2.00
52663-64-6	179-HpCB	U	2	pg/g	2.00
35065-29-3	180-HpCB	CU	4	pg/g	4.00
74472-47-2	181-HpCB	U	2	pg/g	2.00
60145-23-5	182-HpCB	U	2	pg/g	2.00
52663-69-1	183-HpCB	CU	4	pg/g	4.00
74472-48-3	184-HpCB	U	2	pg/g	2.00
52712-05-7	185-HpCB	C183			
74472-49-4	186-HpCB	U	2	pg/g	2.00
52663-68-0	187-HpCB	U	2	pg/g	2.00
74487-85-7	188-HpCB	U	2	pg/g	2.00
39635-31-9	189-HpCB	U	2	pg/g	2.00
41411-64-7	190-HpCB	U	2	pg/g	2.00
74472-50-7	191-HpCB	U	2	pg/g	2.00
74472-51-8	192-HpCB	U	2	pg/g	2.00

Comments:

C Congener has coeluters. When Cxxx, refer to congener number xxx for data

U Analyte was analyzed for, but not detected above the specified detection limit.

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**12018129**			**Matrix:**	**TISSUE**
Client Sample:	**QC for batch 34094**				
Client ID:	**MB for batch 34094**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**02/28/2017 07:28**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d27feb17a_2-4**			**Dilution:**	**1**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
69782-91-8	193-HpCB	C180			
35694-08-7	194-OcCB	U	2	pg/g	2.00
52663-78-2	195-OcCB	U	2	pg/g	2.00
42740-50-1	196-OcCB	U	2	pg/g	2.00
33091-17-7	197-OcCB	CU	4	pg/g	4.00
68194-17-2	198-OcCB	CU	4	pg/g	4.00
52663-75-9	199-OcCB	C198			
52663-73-7	200-OcCB	C197			
40186-71-8	201-OcCB	U	2	pg/g	2.00
2136-99-4	202-OcCB	U	2	pg/g	2.00
52663-76-0	203-OcCB	U	2	pg/g	2.00
74472-52-9	204-OcCB	U	2	pg/g	2.00
74472-53-0	205-OcCB	U	2	pg/g	2.00
40186-72-9	206-NoCB	U	2	pg/g	2.00
52663-79-3	207-NoCB	U	2	pg/g	2.00
52663-77-1	208-NoCB	U	2	pg/g	2.00
2051-24-3	209-DeCB	U	2	pg/g	2.00
1336-36-3	Total PCB Congeners	U	2	pg/g	2.00

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1-MoCB		105	200	pg/g	52.4	(5%-145%)
13C-3-MoCB		109	200	pg/g	54.5	(5%-145%)
13C-4-DiCB		111	200	pg/g	55.3	(5%-145%)
13C-15-DiCB		215	200	pg/g	108	(5%-145%)
13C-19-TrCB		142	200	pg/g	71.1	(5%-145%)
13C-37-TrCB		188	200	pg/g	94.2	(5%-145%)
13C-54-TeCB		118	200	pg/g	58.8	(5%-145%)
13C-77-TeCB		237	200	pg/g	119	(10%-145%)
13C-81-TeCB		239	200	pg/g	119	(10%-145%)
13C-104-PeCB		147	200	pg/g	73.3	(10%-145%)
13C-105-PeCB		212	200	pg/g	106	(10%-145%)
13C-114-PeCB		207	200	pg/g	103	(10%-145%)
13C-118-PeCB		208	200	pg/g	104	(10%-145%)
13C-123-PeCB		215	200	pg/g	107	(10%-145%)
13C-126-PeCB		227	200	pg/g	113	(10%-145%)
13C-155-HxCB		153	200	pg/g	76.7	(10%-145%)
13C-156-HxCB	C	394	400	pg/g	98.5	(10%-145%)
13C-157-HxCB	C156L					
13C-167-HxCB		200	200	pg/g	100	(10%-145%)
13C-169-HxCB		213	200	pg/g	107	(10%-145%)
13C-188-HpCB		127	200	pg/g	63.7	(10%-145%)
13C-189-HpCB		170	200	pg/g	85.1	(10%-145%)

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**12018129**			**Matrix:**	**TISSUE**
Client Sample:	**QC for batch 34094**				
Client ID:	**MB for batch 34094**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**02/28/2017 07:28**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d27feb17a_2-4**			**Dilution:**	**1**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-202-OcCB		137	200	pg/g	68.5	(10%-145%)
13C-205-OcCB		190	200	pg/g	94.8	(10%-145%)
13C-206-NoCB		165	200	pg/g	82.4	(10%-145%)
13C-208-NoCB		153	200	pg/g	76.7	(10%-145%)
13C-209-DeCB		204	200	pg/g	102	(10%-145%)
13C-28-TrCB		137	200	pg/g	68.5	(5%-145%)
13C-111-PeCB		183	200	pg/g	91.6	(10%-145%)
13C-178-HpCB		187	200	pg/g	93.5	(10%-145%)

Comments:

C Congener has coeluters. When Cxxx, refer to congener number xxx for data

U Analyte was analyzed for, but not detected above the specified detection limit.

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**12018130**			**Matrix:**	**TISSUE**
Client Sample:	**QC for batch 34094**				
Client ID:	**LCS for batch 34094**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**02/28/2017 05:11**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d27feb17a_2-2**			**Dilution:**	**1**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
2051-60-7	1-MoCB		56.5	pg/g	2.00
2051-62-9	3-MoCB		62.1	pg/g	2.00
13029-08-8	4-DiCB		48.6	pg/g	2.00
2050-68-2	15-DiCB		64.1	pg/g	2.00
38444-73-4	19-TrCB		53.2	pg/g	2.00
38444-90-5	37-TrCB		51.2	pg/g	2.00
15968-05-5	54-TeCB		110	pg/g	2.00
32598-13-3	77-TeCB		105	pg/g	2.00
70362-50-4	81-TeCB		120	pg/g	2.00
56558-16-8	104-PeCB		128	pg/g	2.00
32598-14-4	105-PeCB		123	pg/g	2.00
74472-37-0	114-PeCB		116	pg/g	2.00
31508-00-6	118-PeCB		107	pg/g	2.00
65510-44-3	123-PeCB		103	pg/g	2.00
57465-28-8	126-PeCB		122	pg/g	2.00
33979-03-2	155-HxCB		104	pg/g	2.00
38380-08-4	156-HxCB	C	239	pg/g	4.00
69782-90-7	157-HxCB	C156			
52663-72-6	167-HxCB		125	pg/g	2.00
32774-16-6	169-HxCB		117	pg/g	2.00
74487-85-7	188-HpCB		104	pg/g	2.00
39635-31-9	189-HpCB		109	pg/g	2.00
2136-99-4	202-OcCB		148	pg/g	2.00
74472-53-0	205-OcCB		154	pg/g	2.00
40186-72-9	206-NoCB		154	pg/g	2.00
52663-77-1	208-NoCB		164	pg/g	2.00
2051-24-3	209-DeCB		145	pg/g	2.00

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1-MoCB		110	200	pg/g	55.2	(15%-145%)
13C-3-MoCB		125	200	pg/g	62.4	(15%-145%)
13C-4-DiCB		124	200	pg/g	61.9	(15%-145%)
13C-15-DiCB		212	200	pg/g	106	(15%-145%)
13C-19-TrCB		152	200	pg/g	76.2	(15%-145%)
13C-37-TrCB		201	200	pg/g	101	(15%-145%)
13C-54-TeCB		138	200	pg/g	69.2	(15%-145%)
13C-77-TeCB		260	200	pg/g	130	(40%-145%)
13C-81-TeCB		262	200	pg/g	131	(40%-145%)
13C-104-PeCB		158	200	pg/g	78.8	(40%-145%)
13C-105-PeCB		235	200	pg/g	118	(40%-145%)
13C-114-PeCB		230	200	pg/g	115	(40%-145%)
13C-118-PeCB		232	200	pg/g	116	(40%-145%)

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**12018130**			**Matrix:**	**TISSUE**
Client Sample:	**QC for batch 34094**				
Client ID:	**LCS for batch 34094**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**02/28/2017 05:11**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d27feb17a_2-2**			**Dilution:**	**1**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-123-PeCB		238	200	pg/g	119	(40%-145%)
13C-126-PeCB		247	200	pg/g	123	(40%-145%)
13C-155-HxCB		164	200	pg/g	81.8	(40%-145%)
13C-156-HxCB	C	417	400	pg/g	104	(40%-145%)
13C-157-HxCB	C156L					
13C-167-HxCB		213	200	pg/g	107	(40%-145%)
13C-169-HxCB		222	200	pg/g	111	(40%-145%)
13C-188-HpCB		159	200	pg/g	79.4	(40%-145%)
13C-189-HpCB		199	200	pg/g	99.5	(40%-145%)
13C-202-OcCB		169	200	pg/g	84.3	(40%-145%)
13C-205-OcCB		219	200	pg/g	109	(40%-145%)
13C-206-NoCB		199	200	pg/g	99.4	(40%-145%)
13C-208-NoCB		183	200	pg/g	91.4	(40%-145%)
13C-209-DeCB		249	200	pg/g	124	(40%-145%)
13C-28-TrCB		153	200	pg/g	76.6	(15%-145%)
13C-111-PeCB		201	200	pg/g	100	(40%-145%)
13C-178-HpCB		203	200	pg/g	102	(40%-145%)

Comments:

C Congener has coeluters. When Cxxx, refer to congener number xxx for data

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**12018131**			**Matrix:**	**TISSUE**
Client Sample:	**QC for batch 34094**				
Client ID:	**LCSD for batch 34094**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**02/28/2017 06:20**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d27feb17a_2-3**			**Dilution:**	**1**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	PQL
2051-60-7	1-MoCB		57.3	pg/g	2.00
2051-62-9	3-MoCB		64.5	pg/g	2.00
13029-08-8	4-DiCB		48.0	pg/g	2.00
2050-68-2	15-DiCB		64.3	pg/g	2.00
38444-73-4	19-TrCB		52.1	pg/g	2.00
38444-90-5	37-TrCB		53.2	pg/g	2.00
15968-05-5	54-TeCB		112	pg/g	2.00
32598-13-3	77-TeCB		106	pg/g	2.00
70362-50-4	81-TeCB		120	pg/g	2.00
56558-16-8	104-PeCB		130	pg/g	2.00
32598-14-4	105-PeCB		125	pg/g	2.00
74472-37-0	114-PeCB		117	pg/g	2.00
31508-00-6	118-PeCB		106	pg/g	2.00
65510-44-3	123-PeCB		101	pg/g	2.00
57465-28-8	126-PeCB		121	pg/g	2.00
33979-03-2	155-HxCB		103	pg/g	2.00
38380-08-4	156-HxCB	C	237	pg/g	4.00
69782-90-7	157-HxCB	C156			
52663-72-6	167-HxCB		124	pg/g	2.00
32774-16-6	169-HxCB		118	pg/g	2.00
74487-85-7	188-HpCB		105	pg/g	2.00
39635-31-9	189-HpCB		109	pg/g	2.00
2136-99-4	202-OcCB		150	pg/g	2.00
74472-53-0	205-OcCB		154	pg/g	2.00
40186-72-9	206-NoCB		155	pg/g	2.00
52663-77-1	208-NoCB		165	pg/g	2.00
2051-24-3	209-DeCB		146	pg/g	2.00

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1-MoCB		92.6	200	pg/g	46.3	(15%-145%)
13C-3-MoCB		98.6	200	pg/g	49.3	(15%-145%)
13C-4-DiCB		101	200	pg/g	50.3	(15%-145%)
13C-15-DiCB		177	200	pg/g	88.7	(15%-145%)
13C-19-TrCB		126	200	pg/g	63.0	(15%-145%)
13C-37-TrCB		160	200	pg/g	80.1	(15%-145%)
13C-54-TeCB		103	200	pg/g	51.4	(15%-145%)
13C-77-TeCB		213	200	pg/g	106	(40%-145%)
13C-81-TeCB		216	200	pg/g	108	(40%-145%)
13C-104-PeCB		120	200	pg/g	60.2	(40%-145%)
13C-105-PeCB		184	200	pg/g	91.8	(40%-145%)
13C-114-PeCB		183	200	pg/g	91.6	(40%-145%)
13C-118-PeCB		183	200	pg/g	91.3	(40%-145%)

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**L1701310**	**Client:**	**ALPH001**	**Project:**	**ALPH00416**
Lab Sample ID:	**12018131**			**Matrix:**	**TISSUE**
Client Sample:	**QC for batch 34094**				
Client ID:	**LCSD for batch 34094**			**Prep Basis:**	**As Received**
Batch ID:	**34096**	**Method:**	**EPA Method 1668C**		
Run Date:	**02/28/2017 06:20**	**Analyst:**	**MJC**	**Instrument:**	**HRP875**
Data File:	**d27feb17a_2-3**			**Dilution:**	**1**
Prep Batch:	**34094**	**Prep Method:**	**SW846 3540C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**26-FEB-17**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-123-PeCB		189	200	pg/g	94.3	(40%-145%)
13C-126-PeCB		191	200	pg/g	95.6	(40%-145%)
13C-155-HxCB		136	200	pg/g	67.8	(40%-145%)
13C-156-HxCB	C	335	400	pg/g	83.7	(40%-145%)
13C-157-HxCB	C156L					
13C-167-HxCB		171	200	pg/g	85.4	(40%-145%)
13C-169-HxCB		179	200	pg/g	89.3	(40%-145%)
13C-188-HpCB		117	200	pg/g	58.7	(40%-145%)
13C-189-HpCB		146	200	pg/g	73.0	(40%-145%)
13C-202-OcCB		123	200	pg/g	61.4	(40%-145%)
13C-205-OcCB		165	200	pg/g	82.7	(40%-145%)
13C-206-NoCB		143	200	pg/g	71.4	(40%-145%)
13C-208-NoCB		133	200	pg/g	66.5	(40%-145%)
13C-209-DeCB		180	200	pg/g	90.2	(40%-145%)
13C-28-TrCB		117	200	pg/g	58.3	(15%-145%)
13C-111-PeCB		154	200	pg/g	77.1	(40%-145%)
13C-178-HpCB		161	200	pg/g	80.4	(40%-145%)

Comments:

C Congener has coeluters. When Cxxx, refer to congener number xxx for data

Attachment E

Agency Correspondence

NJDEP Natural Heritage Database Consultation

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Division of Parks & Forestry
State Forestry Service
Mail Code 501-04
Office of Natural Lands Management – Natural Heritage Program
P.O. Box 420
Trenton, NJ 08625-0420
Tel. (609) 984-1339 Fax. (609) 984-1427

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

January 26, 2017

David Brizzolara
HDR Engineering, Inc.
1 International Boulevard, 10th Fl., Suite 1000
Mahwah, NJ 07495-0027

Re: Whale Creek Mitigation Bank
Block(s) - 1050, Lot(s) - 1.11
Old Bridge Township, Middlesex County

Dear Mr. Brizzolara:

Thank you for your data request regarding rare species information for the above referenced project site.

Searches of the Natural Heritage Database and the Landscape Project (Version 3.1) are based on a representation of the boundaries of your project site in our Geographic Information System (GIS). We make every effort to accurately transfer your project bounds from the topographic map(s) submitted with the Natural Heritage Data Request Form into our Geographic Information System. We do not typically verify that your project bounds are accurate, or check them against other sources.

We have checked the Landscape Project habitat mapping and the Biotics Database for occurrences of any rare wildlife species or wildlife habitat on the referenced site. The Natural Heritage Database was searched for occurrences of rare plant species or ecological communities that may be on the project site. Please refer to Table 1 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented on site. A detailed report is provided for each category coded as 'Yes' in Table 1.

This report does not include information concerning known Northern Long-eared Bat hibernacula and maternity roost trees protected under the provisions of the U.S. Fish & Wildlife Service's 4(d) Rule. You must contact the U.S. Fish & Wildlife Service, New Jersey Field Office, for additional information concerning the location of these features, or visit their website at: http://www.fws.gov/northeast/njfieldoffice/endangered/consultation.html.

We have also checked the Landscape Project habitat mapping and Biotics Database for occurrences of rare wildlife species or wildlife habitat in the immediate vicinity (within ¼ mile) of the referenced site. Additionally, the Natural Heritage Database was checked for occurrences of rare plant species or ecological communities within ¼ mile of the site. Please refer to Table 2 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented within the immediate vicinity of the site. Detailed reports are provided for all categories coded as 'Yes' in Table 2. These reports may include species that have also been documented on the project site.

We have also checked the Landscape Project habitat mapping and Biotics Database for all occurrences of rare wildlife species or wildlife habitat within one mile of the referenced site. Please refer to Table 3 (attached) to determine if any rare wildlife species or wildlife habitat is documented within one mile of the project site. Detailed reports are provided for each category coded as 'Yes' in Table 3. These reports may include species that have also been documented on the project site.

NHP File No. 17-4007442-11319

For requests submitted as part of a Flood Hazard Area Control Act (FHACA) rule application, we report records for all rare plant species and ecological communities tracked by the Natural Heritage Program that may be on, or in the immediate vicinity of, your project site. A subset of these plant species are also covered by the FHACA rules when the records are located within one mile of the project site. One mile searches for FHACA plant species will only report precisely located occurrences for those wetland plant species identified under the FHACA regulations as being critically dependent on the watercourse. Please refer to Table 3 (attached) to determine if any precisely located rare wetland plant species covered by the FHACA rules have been documented. Detailed reports are provided for each category coded as 'Yes' in Table 3. These reports may include species that have also been documented on, or in the immediate vicinity of, the project site.

The Natural Heritage Program reviews its data periodically to identify priority sites for natural diversity in the State. Included as priority sites are some of the State's best habitats for rare and endangered species and ecological communities. Please refer to Tables 1, 2 and 3 (attached) to determine if any priority sites are located on, in the immediate vicinity, or within one mile of the project site.

A list of rare plant species and ecological communities that have been documented from the county (or counties), referenced above, can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/countylist.html. If suitable habitat is present at the project site, the species in that list have potential to be present.

Status and rank codes used in the tables and lists are defined in EXPLANATION OF CODES USED IN NATURAL HERITAGE REPORTS, which can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/nhpcodes_2010.pdf.

If you have questions concerning the wildlife records or wildlife species mentioned in this response, we recommend that you visit the interactive NJ-GeoWeb website at the following URL, http://www.state.nj.us/dep/gis/geowebsplash.htm or contact the Division of Fish and Wildlife, Endangered and Nongame Species Program at (609) 292-9400.

PLEASE SEE 'CAUTIONS AND RESTRICTIONS ON NHP DATA', which can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/newcaution2008.pdf.

Thank you for consulting the Natural Heritage Program. The attached invoice details the payment due for processing this data request. Feel free to contact us again regarding any future data requests.

Sincerely,

Robert J. Cartica
Administrator

c: NHP File No. 17-4007442-11319

Mail Code 501-04
Department of Environmental Protection
State Forestry Service
Office of Natural Lands Management
P.O. Box 420 Trenton, New Jersey 08625-0420
Tel. (609) 984-1339 Fax. (609) 984-1427

Invoice

Date	Invoice #
1/26/2017	11319

Bill to:
HDR Engineering, Inc.
1 International Boulevard, 10th Fl., Suite 1000
Mahwah, NJ 07495-0027

Make check payable to:
Office of Natural Lands Management
And forward with a copy of this statement to:
Mail Code 501-04
Office of Natural Lands Management
P.O. Box 420 Trenton, New Jersey 08625-0420

Quantity (hrs.)	Description	Rate (per hr.)	Amount
1	Natural Heritage Database search for locational information of rare species and ecological communities. Project: 17-4007442-11319	$ 70.00	$ 70.00
David Brizzolara Project Name: Whale Creek Mitigation Bank		**Total**	$ 70.00

NHP File No. 17-4007442-11319

Table 1: On Site Data Request Search Results (6 Possible Reports)

Report Name	Included	Number of Pages
1. Possibly on Project Site Based on Search of Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database	No	0 pages included
2. Natural Heritage Priority Sites On Site	No	0 pages included
3. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Species Based Patches	Yes	1 page(s) included
4. Vernal Pool Habitat on the Project Site Based on Search of Landscape Project 3.1	No	0 pages included
5. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Stream Habitat File	No	0 pages included
6. Other Animal Species On the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program	No	0 pages included

Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Species Based Patches

Class	Common Name	Scientific Name	Feature Type	Rank	Federal Protection Status	State Protection Status	Grank	Srank
Aves								
	Black-crowned Night-heron	Nycticorax nycticorax	Foraging	3	NA	State Threatened	G5	S2B,S3N
	Glossy Ibis	Plegadis falcinellus	Foraging	2	NA	Special Concern	G5	S3B,S4N
	Snowy Egret	Egretta thula	Foraging	2	NA	Special Concern	G5	S3B,S4N

Table 2: Vicinity Data Request Search Results (6 possible reports)

Report Name	**Included**	**Number of Pages**
1. Immediate Vicinity of the Project Site Based on Search of Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database	No	0 pages included
2. Natural Heritage Priority Sites within the Immediate Vicinity	No	0 pages included
3. Rare Wildlife Species or Wildlife Habitat Within the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Species Based Patches	Yes	1 page(s) included
4. Vernal Pool Habitat In the Immediate Vicinity of Project Site Based on Search of Landscape Project 3.1	No	0 pages included
5. Rare Wildlife Species or Wildlife Habitat In the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Stream Habitat File	No	0 pages included
6. Other Animal Species In the Immediate Vicinity of the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program	No	0 pages included

Rare Wildlife Species or Wildlife Habitat Within the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.1 Species Based Patches

Class	Common Name	Scientific Name	Feature Type	Rank	Federal Protection Status	State Protection Status	Grank	Srank
Aves								
	Black-crowned Night-heron	Nycticorax nycticorax	Foraging	3	NA	State Threatened	G5	S2B,S3N
	Glossy Ibis	Plegadis falcinellus	Foraging	2	NA	Special Concern	G5	S3B,S4N
	Osprey	Pandion haliaetus	Foraging	3	NA	State Threatened	G5	S2B
	Snowy Egret	Egretta thula	Foraging	2	NA	Special Concern	G5	S3B,S4N

Table 3: Within 1 Mile for FHACA Searches (6 possible reports)

Report Name	Included	Number of Pages
1. Rare Plant Species Occurrences Covered by the Flood Hazard Area Control Act Rule Within One Mile of the Project Site Based on Search of Natural Heritage Database	No	0 pages included
2. Natural Heritage Priority Sites within 1 mile	No	0 pages included
3. Rare Wildlife Species or Wildlife Habitat Within One Mile of the Project Site Based on Search of Landscape Project 3.1 Species Based Patches	Yes	1 page(s) included
4. Vernal Pool Habitat Within One Mile of the Project Site Based on Search of Landscape Project 3.1	No	0 pages included
5. Rare Wildlife Species or Wildlife Habitat Within One Mile of the Project Site Based on Search of Landscape Project 3.1 Stream Habitat File	No	0 pages included
6. Other Animal Species Within One Mile of the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program	No	0 pages included

Rare Wildlife Species or Wildlife Habitat Within One Mile of the Project Site Based on Search of Landscape Project 3.1 Species Based Patches

Class	Common Name	Scientific Name	Feature Type	Rank	Federal Protection Status	State Protection Status	Grank	Srank
Amphibia								
	Pine Barrens Treefrog	Hyla andersonii	Vernal Pool Breeding	3	NA	State Threatened	G4	S2
Aves								
	Bald Eagle	Haliaeetus leucocephalus	Foraging	4	NA	State Endangered	G5	S1B,S2N
	Black-crowned Night-heron	Nycticorax nycticorax	Foraging	3	NA	State Threatened	G5	S2B,S3N
	Glossy Ibis	Plegadis falcinellus	Foraging	2	NA	Special Concern	G5	S3B,S4N
	Least Tern	Sternula antillarum	Foraging	4	NA	State Endangered	G4	S1B,S1N
	Little Blue Heron	Egretta caerulea	Foraging	2	NA	Special Concern	G5	S3B,S3N
	Osprey	Pandion haliaetus	Foraging	3	NA	State Threatened	G5	S2B
	Osprey	Pandion haliaetus	Nest	3	NA	State Threatened	G5	S2B
	Snowy Egret	Egretta thula	Foraging	2	NA	Special Concern	G5	S3B,S4N
	Yellow-crowned Night-heron	Nyctanassa violacea	Foraging	3	NA	State Threatened	G5	S2B,S2N
Reptilia								
	Atlantic Loggerhead	Caretta caretta	Occupied Habitat	5	Federally Listed Threatened	State Endangered	G3	S1

Changes to Natural Heritage Database Reports
Effective April 8, 2016

Beginning on April 8, 2016 the Natural Heritage Program is making several significant changes to the reports used to provide information about rare plants and ecological communities. **There is no change to the reports for rare animal species and wildlife habitat.**

These changes are being implemented in order to provide similar reports and information for users requesting standard database searches and for those requesting searches for projects subject to the Flood Hazard Area Control Act rules.

All users will continue to receive reports listing all rare species and ecological communities that may be on their project sites. There is no change to these reports.

All users will now receive a consolidated report for all occurrences of rare plant species and ecological communities in the immediate vicinity (within ¼ mile) of their project sites. These reports will include rare plant species and ecological communities in addition to those wetland species regulated by the Flood Hazard Area Control Act rules; the information may be used for planning purposes or when applying for other permits. Additionally, these reports may include records for rare plant species for which the precise location of the occurrence is not known. These are often older records, and surveys are needed in order to determine the current condition and location of these occurrences in relation to proposed projects.

Users requesting reports for Flood Hazard Area Control Act (FHACA) permits will continue to receive the same reports for those wetland plant species identified by the FHACA regulations as being critically dependent on the watercourse. These reports are limited to precisely located records for these species within one mile of the project site. The Department of Environmental Protection, Division of Land Use Regulation (DLUR) will use this report to determine whether the habitat for any regulated plant species occurs on site or within one mile downstream. The Natural Heritage Program cannot make a regulatory determination about whether rare species occurrences on these reports are subject to the provisions of the FHACA. Applicants should contact the DLUR directly.

USFWS Official Species List

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Jersey Ecological Services Field Office
4 EAST JIMMIE LEEDS ROAD UNIT 4
GALLOWAY, NJ 08205
PHONE: (609)382-5273 FAX: (609)646-0352
URL: www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

Consultation Code: 05E2NJ00-2017-SLI-0460 February 03, 2017
Event Code: 05E2NJ00-2017-E-00677
Project Name: Whale Creek

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species that may occur in your proposed action area and/or may be affected by your proposed project. This species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under Section 7(c) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*)

If the enclosed list indicates that any listed species may be present in your action area, please visit the New Jersey Field Office consultation web page as the next step in evaluating potential project impacts: http://www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

On the New Jersey Field Office consultation web page you will find:

- habitat descriptions, survey protocols, and recommended best management practices for listed species;
- recommended procedures for submitting information to this office; and
- links to other Federal and State agencies, the Section 7 Consultation Handbook, the Service's wind energy guidelines, communication tower recommendations, the National Bald Eagle Management Guidelines, and other resources and recommendations for protecting wildlife resources.

The enclosed list may change as new information about listed species becomes available. As per Federal regulations at 50 CFR 402.12(e), the enclosed list is only valid for 90 days. Please return to the ECOS-IPaC website at regular intervals during project planning and implementation to obtain an updated species list. When using ECOS-IPaC, be careful about drawing the boundary of your Project Location. Remember that your action area under the ESA

is not limited to just the footprint of the project. The action area also includes all areas that may be indirectly affected through impacts such as noise, visual disturbance, erosion, sedimentation, hydrologic change, chemical exposure, reduced availability or access to food resources, barriers to movement, increased human intrusions or access, and all areas affected by reasonably forseeable future that would not occur without ("but for") the project that is currently being proposed.

We appreciate your concern for threatened and endangered species. The Service encourages Federal and non-Federal project proponents to consider listed, proposed, and candidate species early in the planning process. Feel free to contact this office if you would like more information or assistance evaluating potential project impacts to federally listed species or other wildlife resources. Please include the Consultation Tracking Number in the header of this letter with any correspondence about your project.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Whale Creek

Official Species List

Provided by:

New Jersey Ecological Services Field Office
4 EAST JIMMIE LEEDS ROAD UNIT 4
GALLOWAY, NJ 08205
(609) 382-5273
http://www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

Consultation Code: 05E2NJ00-2017-SLI-0460
Event Code: 05E2NJ00-2017-E-00677

Project Type: ** OTHER **

Project Name: Whale Creek
Project Description: On behalf of Evergreen Environmental, LLC, HDR Engineering, Inc. (HDR) requests that you provide an official species list in the area affected by the proposed development of an approximately 18.68 acre mitigation site along Whale Creek, a tributary of the Raritan Bay, in the town of Old Bridge, Middlesex County, New Jersey. The site is bordered on the west side by NJ Route 35; on the north by residential development; on the south by commercial development; and on the east by municipal and county-owned open space (see Project Location Map).

The 18.28-acre proposed Evergreen Whale Creek Point Mitigation Bank currently consists of open water, wetland and upland habitats. The site was once tidal marshlands that were hydrologically connected to the Raritan Bay through Whale Creek. The site currently has a diminished habitat value due to monotypic stands of Phragmites australis and a greatly reduced level of tidal exchange due to sediment accretion associated with Phragmites australis. Evergreen Environmental, LLC, intends to open tidal flow through re-grading and planting with native emergent marsh species.

Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

Project Location Map:

Project Coordinates: MULTIPOLYGON (((-74.23418023484993 40.446767038011444, -74.23394163634038 40.44693601943885, -74.23298818063665 40.44615983941867, -74.23262404679997 40.44642814856144, -74.23267195914696 40.446480852143, -74.2315316452902 40.44705580030603, -74.23128729232087 40.446773117459315, -74.23088003737206 40.44696476684686, -74.23068838798434 40.446734787581704, -74.22980680080099 40.447151625000004, -74.2266541683735 40.444559567031376, -74.22694164245502 40.444526028388566, -74.22725307271003 40.444559567031376, -74.22785197704656 40.44468893036816, -74.22920310522977 40.445187218776205, -74.2299984501887 40.4455178139699, -74.23031467167834 40.445560935082085, -74.2308417074945 40.44571425459225, -74.23130645725962 40.445594473724896, -74.23166100862682 40.44539324186792, -74.2317232946778 40.445330955816935, -74.23176162455542 40.444995569388425, -74.2318430755451 40.44486141481707, -74.23418023484993 40.446767038011444)))

Project Counties: Middlesex, NJ | Monmouth, NJ

Endangered Species Act Species List

There are a total of 4 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Birds	**Status**	**Has Critical Habitat**	**Condition(s)**
Red Knot *(Calidris canutus rufa)* Population: Wherever found	Threatened		
Flowering Plants			
Seabeach amaranth *(Amaranthus pumilus)* Population: Wherever found	Threatened		
Swamp pink *(Helonias bullata)* Population: Wherever found	Threatened		
Mammals			
Northern long-eared Bat *(Myotis septentrionalis)* Population: Wherever found	Threatened		

Critical habitats that lie within your project area

There are no critical habitats within your project area.

Appendix A: FWS National Wildlife Refuges and Fish Hatcheries

There are no refuges or fish hatcheries within your project area.

United States Department of Interior
Fish and Wildlife Service

Project name: Whale Creek

Appendix B: FWS Migratory Birds

The protection of birds is regulated by the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA). Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). The MBTA has no otherwise lawful activities. For more information regarding these Acts see:
http://www.fws.gov/birds/policies-and-regulations/laws-legislations/migratory-bird-treaty-act.php
http://www.fws.gov/birds/policies-and-regulations/laws-legislations/bald-and-golden-eagle-protection-act.php

All project proponents are responsible for complying with the appropriate regulations protecting birds when planning and developing a project. To meet these conservation obligations, proponents should identify potential or existing project-related impacts to migratory birds and their habitat and develop and implement conservation measures that avoid, minimize, or compensate for these impacts. The Service's Birds of Conservation Concern (2008) report identifies species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become listed under the Endangered Species Act as amended (16 U.S.C 1531 et seq.).

For information about Birds of Conservation Concern, go to:
http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php

For information about conservation measures that help avoid or minimize impacts to birds, please visit:
http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php

To search and view summaries of year-round bird occurrence data within your project area, go to the Avian Knowledge Network Histogram Tools at:
http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/akn-histogram-tools.php

United States Department of Interior
Fish and Wildlife Service

Project name: Whale Creek

Migratory birds that may be affected by your project:

There are 27 birds on your migratory bird list. The list may include birds occurring outside this FWS office jurisdiction.

Species Name	Bird of Conservation Concern (BCC)	Seasonal Occurrence in Project Area
American bittern *(Botaurus lentiginosus)*	Yes	On Land: Breeding
American Oystercatcher *(Haematopus palliatus)*	Yes	On Land: Year-round
Bald eagle *(Haliaeetus leucocephalus)*	Yes	On Land: Year-round
Black Skimmer *(Rynchops niger)*	Yes	On Land: Breeding
Black-billed Cuckoo *(Coccyzus erythropthalmus)*	Yes	On Land: Breeding
Blue-winged Warbler *(Vermivora pinus)*	Yes	On Land: Breeding
Canada Warbler *(Wilsonia canadensis)*	Yes	On Land: Breeding
Fox Sparrow *(Passerella liaca)*	Yes	On Land: Wintering
Gull-billed Tern *(Gelochelidon nilotica)*	Yes	On Land: Breeding
Hudsonian Godwit *(Limosa haemastica)*	Yes	At Sea: Migrating
Kentucky Warbler *(Oporornis formosus)*	Yes	On Land: Breeding
Least bittern *(Ixobrychus exilis hesperis)*	No	On Land: Breeding
Least tern *(Sterna antillarum)*	Yes	On Land: Breeding
Peregrine Falcon *(Falco peregrinus)*	Yes	On Land: Wintering
Pied-billed Grebe *(Podilymbus podiceps)*	Yes	On Land: Year-round
Prairie Warbler *(Dendroica discolor)*	Yes	On Land: Breeding

Purple Sandpiper *(Calidris maritima)*	Yes	On Land: Wintering
Red Knot *(Calidris canutus rufa)*	Yes	On Land: Wintering
Rusty Blackbird *(Euphagus carolinus)*	Yes	On Land: Wintering
Saltmarsh Sparrow *(Ammodramus caudacutus)*	Yes	On Land: Breeding
Seaside Sparrow *(Ammodramus maritimus)*	Yes	On Land: Year-round
Short-eared Owl *(Asio flammeus)*	Yes	On Land: Wintering
Snowy Egret *(Egretta thula)*	Yes	On Land: Breeding
Upland Sandpiper *(Bartramia longicauda)*	Yes	On Land: Breeding
Willow Flycatcher *(Empidonax traillii)*	Yes	On Land: Breeding
Wood Thrush *(Hylocichla mustelina)*	Yes	On Land: Breeding
Worm eating Warbler *(Helmitheros vermivorum)*	Yes	On Land: Breeding

Appendix C: NWI Wetlands

Wetlands data for your project area was not available at the time of this species list request.

NOAA National Marine Fisheries Service Consultation

February 3, 2017

Ms. Karen Greene
Northeast Fisheries Science Center
James J. Howard Marine Sciences Laboratory
74 Magruder Road, Sandy Hook
Highlands, New Jersey 07732

Re: File search request for EFH in Old Bridge, Middlesex County, New Jersey for the Evergreen Whale Creek Point Mitigation Bank.

Ms. Greene,

On behalf of Evergreen Environmental, LLC, HDR Engineering, Inc. (HDR) requests that you provide a file review for any Essential Fish Habitat (EFH) in the area affected by the proposed development of an approximately 18.68 acre mitigation site along Whale Creek, a tributary of the Raritan Bay, in the town of Old Bridge, Middlesex County, New Jersey. The site is bordered on the west side by NJ Route 35; on the north by residential development; on the south by commercial development; and on the east by municipal and county-owned open space (see Project Location Map).

The 18.28-acre proposed Evergreen Whale Creek Point Mitigation Bank currently consists of open water, wetland and upland habitats. The site was once tidal marshlands that were fully hydrologically connected to the Raritan Bay through Whale Creek. The site currently has a diminished habitat value due to monotypic stands of *Phragmites australis* and a greatly reduced level of tidal exchange due to sediment accretion associated with *Phragmites australis*. Evergreen Environmental, LLC, intends to open tidal flow through re-grading and planting with native emergent marsh species.

Species with EFH designations within the nearest 10-minute grid square are presented in Table 1. The project will result in increased and improved habitat for finfish. HDR is seeking concurrence with this conclusion and verification of the species (and their associated life stages) presented in Table 1.

Table 1. EFH Species and Lifestages Identified in the Nearest NMFS 10-minute Grid Square

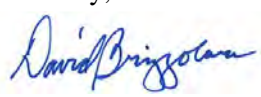
Species	Eggs	Larvae	Juveniles	Adults
red hake *(Urophycis chuss)*		X	X	X
redfish *(Sebastes fasciatus)*	n/a			
winter flounder *(Pseudopleuronectes americanus)*	X	X	X	X
windowpane flounder *(Scophthalmus aquosus)*	X	X	X	X
Atlantic sea herring *(Clupea harengus)*		X	X	X
bluefish *(Pomatomus saltatrix)*			X	X
long finned squid *(Loligo pealeii)*	n/a	n/a		
short finned squid *(Illex illecebrosus)*	n/a	n/a		
Atlantic butterfish *(Peprilus triacanthus)*		X	X	X
Atlantic mackerel *(Scomber scombrus)*			X	X
summer flounder *(Paralichthys dentatus)*		X	X	X
scup *(Stenotomus chrysops)*	X	X	X	X
black sea bass *(Centropristis striata)*	n/a		X	X
surf clam *(Spisula solidissima)*	n/a	n/a		
ocean quahog *(Artica islandica)*	n/a	n/a		
spiny dogfish *(Squalus acanthias)*	n/a	n/a		
king mackerel *(Scomberomorus cavalla)*	X	X	X	X
Spanish mackerel *(Scomberomorus maculatus)*	X	X	X	X
cobia *(Rachycentron canadum)*	X	X	X	X
sandbar shark *(Carcharhinus plumbeus)*		X		X
winter skate (*Leucoraja ocellata*)			X	X
little skate (*Leucoraja erinacea*)			X	X
clearnose skate (*Raja eglanteria*)			X	X

Boundaries to this 10-minute grid square are as follows:

Boundary	North	East	South	West
Coordinate	40° 30.0 N	74° 10.0 W	40° 20.0 N	74° 20.0 W

If you have any questions, or need to request any further information about this project, please contact me at 201.335.9341 or at David.Brizzolara@HDRinc.com.

Sincerely,



David Brizzolara
Environmental Scientist

February 3, 2017

Ms. Karen Greene
Northeast Fisheries Science Center
James J. Howard Marine Sciences Laboratory
74 Magruder Road, Sandy Hook
Highlands, New Jersey 07732

Re: File search request for endangered/threatened species in Old Bridge, Middlesex County, New Jersey for the Evergreen Whale Creek Point Mitigation Bank.

Ms. Greene,

On behalf of Evergreen Environmental, LLC, HDR Engineering, Inc. requests that you provide a file review for any significant habitat, endangered, threatened, and/or special concern species in the area affected by the proposed development of an approximately 18.28-acre mitigation site along Whale Creek, a tributary of the Raritan Bay in Old Bridge, Middlesex County, New Jersey. The site is bordered on the west side by NJ Route 35; on the north by residential development; on the south by commercial development; and on the east by municipal and county-owned open space (see Project Location Map).

The 18.28 acre proposed Evergreen Whale Creek Point Mitigation Bank currently consists of open water, wetland and upland habitats. The site was once tidal marshlands that were fully hydrologically connected to the Raritan River through Whale Creek. The site currently has a diminished habitat value due to monotypic stands of *Phragmites australis* and a greatly reduced level of tidal exchange due to sediment accretion associated with *Phragmites australis*. Evergreen Environmental, LLC, intends to open tidal flow through re-grading and planting with native emergent marsh species. The project will result in increased and improved habitat for finfish.

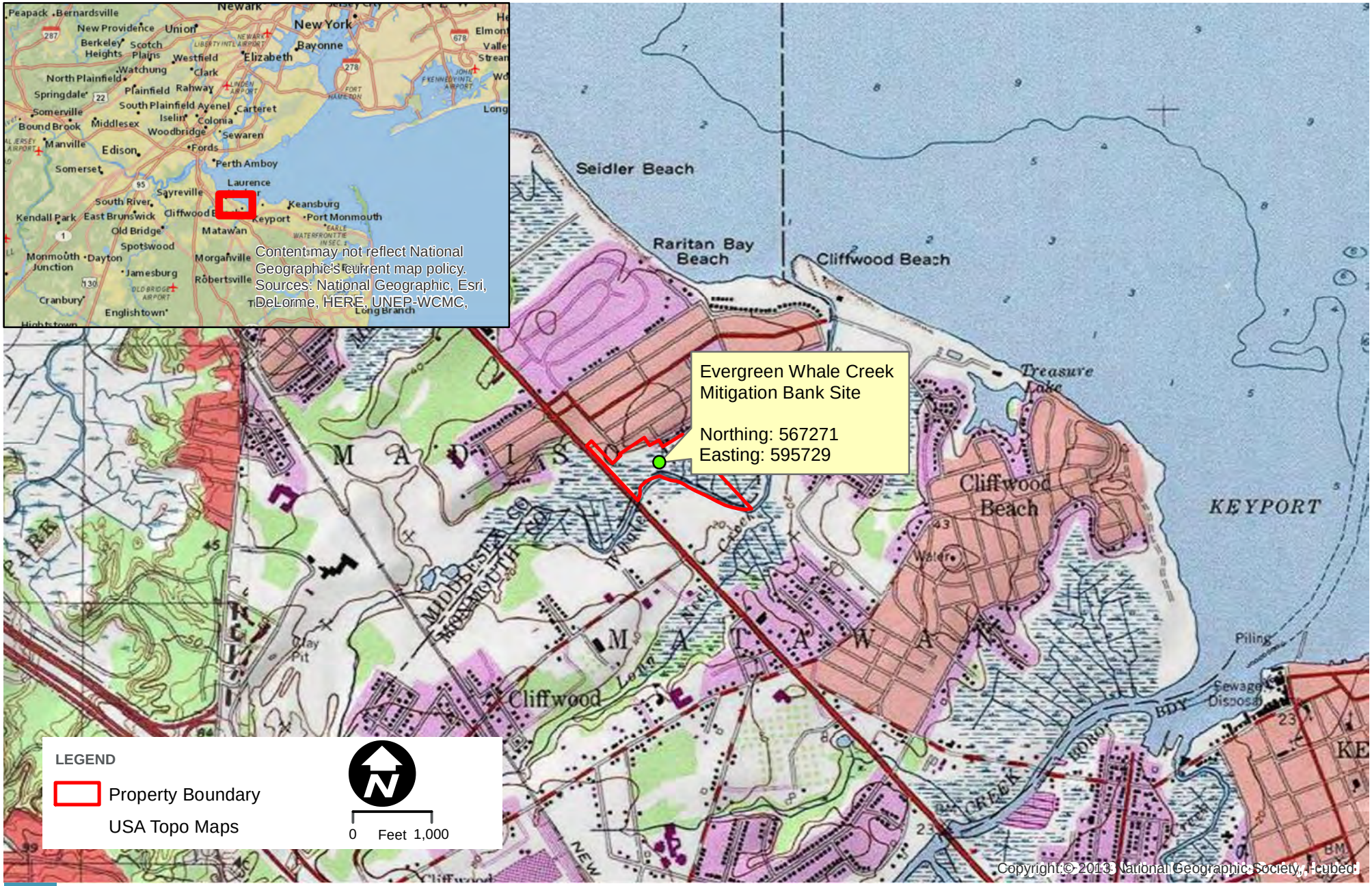
If you have any questions, or need to request any further information about this project, please contact me at 201.335.9341 or at David.Brizzolara@HDRinc.com.

Sincerely,

David Brizzolara
Environmental Scientist

hdrinc.com

1 International Boulevard, 10th Floor, Suite 1000, Mahwah, NJ 07495-0027
(201) 335-9300



EVERGREEN WHALE CREEK MITIGATION BANK SITE - OLD BRIDGE, MIDDLESEX COUNTY, NJ

NOAA REQUEST

FIGURE 1 USGS QUADRANGLE MAP

PATH: \\MAHPI-FILE01\GIS_PROJECTS\448177_EVERGREEN ENVIRONMENTAL LLC\10038062_EVERGREEN-DB-WHALE CREEK\GIS\MXD\USGS MAP_8-8-2016.MXD - USER: JLANGE - DATE: 1/25/2017

From:	Ursula Howson - NOAA Affiliate
To:	Brizzolara, David
Subject:	NMFS Comments - Evergreen Whale Creek Point Mitigation Bank
Date:	Tuesday, February 28, 2017 12:51:31 PM

Hello David,

In response to your letter regarding a request for information on threatened/endangered and EFH species in the above project area, we offer the following information. Please note that the comments below include information relevant to the Endangered Species Act, the Fish and Wildlife Coordination Act, and the Magnuson-Stevens Fishery Conservation and Management Act - Essential Fish Habitat.

Endangered Species Act

No federally listed or proposed threatened or endangered species under our jurisdiction are known to exist in the site of your proposed project. Based on this, we do not believe a consultation in accordance with section 7 of the Endangered Species Act is necessary. As such, no further coordination on this activity with the NMFS Protected Resources Division is necessary at this time. Should project plans change or new information become available that changes the basis for this determination, further coordination should be pursued. Please contact Edith Carson (978-282-8490 or Edith.Carson@noaa.gov), should you have any questions regarding these comments.

Fish and Wildlife Coordination Act

Raritan Bay provides habitat for a wide variety of NOAA resources including resident, migratory and forage fish species including weakfish, tautog, American eel, winter flounder, summer flounder, bluefish and many others. The bay and its tributaries are used as migratory corridors and for spawning, nursery and forage habitat for diadromous species including alewife, blueback herring, striped bass and American eel. Depending upon the nature and extent of the work proposed, seasonal in-water work restrictions or other conditions may be required to avoid, minimize or mitigate for any adverse effects to aquatic resources and their habitats. Compensatory mitigation may also be necessary to offset habitat loss or degradation.

Magnuson-Stevens Fishery Conservation and Management Act - Essential Fish Habitat

Essential Fish Habitat (EFH) has been designated within the project area for a number of federally managed fish species. The Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires federal agencies such as the Army Corps of Engineers to consult us on any action or proposed action authorized, funded, or undertaken by the agency that may adversely affect EFH identified under the MSA. The EFH regulations, 50 CFR Section 600.920, outline that consultation procedure and require the preparation of an EFH assessment by the action agency, or its designated non-federal representative. Based upon the information provided, further EFH consultation by the federal action agency will be

required for this project. For a listing of EFH and further information, please go to our website at:http://www.greateratlantic.fisheries.noaa.gov/habitat/index.html. If you wish to discuss this further, please contact Ursula Howson at 732-872-3116 or ursula.howson@noaa.gov.

Thank you,
Ursula

--

Ursula Howson, PhD
Environmental Specialist
Integrated Statistics, Inc

Under contract to National Marine Fisheries Service
Greater Atlantic Regional Fisheries Office
Habitat Conservation Division
James J. Howard Marine Sciences Laboratory
74 Magruder Rd.
Highlands, NJ 07732
732 872-3116 (office)
ursula.howson@noaa.gov

IRT Consultation for Sediment and Fish Sampling Plan

From:	Handell, Naomi J CIV USARMY CENAN (US)
To:	Mark Renna; Brizzolara, David
Subject:	NAN-2016-00968-EHA Evergreen Whale Creek Mitigation Bank Sediment Sampling Plan Review (UNCLASSIFIED)
Date:	Tuesday, November 22, 2016 5:23:05 PM
Attachments:	Evergreen Whale Creek Mitigatilan_FINAL_toNJDEP_cms comments 3.pdf

CLASSIFICATION: UNCLASSIFIED

Please see the FWS comments below:

Naomi Handell
Project Manager
U.S. Army Corps of Engineers
New York District
Regulatory Branch-Eastern Section
26 Federal Plaza, Room 1937
New York, New York 10278
P: 917-790-8523
F: 212-264-4260

PLEASE USE THE ABOVE 18-CHARACTER FILE NUMBER ON ALL CORRESPONDENCE WITH THIS OFFICE.

-----Original Message-----
From: Mars, Steve [mailto:steve_mars@fws.gov]
Sent: Monday, November 21, 2016 2:47 PM
To: Handell, Naomi J CIV USARMY CENAN (US) <Naomi.J.Handell@usace.army.mil>
Cc: Karen Greene - NOAA Federal <karen.greene@noaa.gov>; Montella, Daniel <Montella.Daniel@epa.gov>; Andrews-Spilman, Anika <anika.andrews-spilman@dep.state.nj.us>
Subject: [EXTERNAL] Fwd: Evergreen Whale Creek Mitigation Bank Sediment Sampling Plan Review

Here is our markup of Evergreen's proposed sampling plan (See HDR Technical Memorandum dated November 10, 2016) and comments below. Any question please feel free to call me at 609-382-5267. Steve

With respect to sampling sediments (n=10) at project depth plus 6" (six inches)

* As stated in Section 2.3, . "VOCs will not be collected from the top six inches because of the possible loss of volatiles from exposure to ambient air." The Service concurs.

* The applicant proposes to analyze the sediment horizon for cyanide by EPA Method 9012. The Service would not request this analysis; interpretation of resultant cyanide data for the purposes of ecological sediment quality would not be useful.

* Target Compound List (TCL) semi-volatile organic compounds (SVOCs) by EPA Method 8270 is acceptable.

* Polychlorinated biphenyls (PCBs) by EPA Method 8082 is not acceptable for ecological evaluations; replace this method with EPA Method 1668 with a detection limit of 1pg/g for any of the 209 congeners.

* Organochlorine pesticides by EPA Method 8081 is acceptable.

* Target Analyte List (TAL) metals by EPA Method 6010/6020, and mercury by EPA Method 7471A are acceptable.

* Analysis of total organic carbon (TOC), pH, and grain size distribution are acceptable; percent moisture must also be reported.

* All 10 samples must be analyzed for 2,3,7,8-chloro-subsituted dioxins/furans by EPA Method 1613 / 8290 (detection limit: 1pg/g each congener).

The Service recommends that 3 mummichog composites be co-located with sediment samples as depicted on the attached map.

The mummichog samples must be analyzed by the following procedures.

* TAL metals and mercury; EPA Method 6010/6020 and 7471, respectively

* TCL Organochlorine pesticides by EPA Method 8081

* PCBs by EPA method 1668 (detection limit: 1pg/g each congener)

* 2,3,7,8-chloro-subsituted dioxins/furans by EPA Method 1613 / 8290 (detection limit: 1pg/g each congener)

* Percent lipid and percent moisture

Detection limits for TALs, TCL SVOCs and Organochlorine pesticides must be less than the screening level concentrations as listed in the NJDEP Ecological Evaluation Guidance, Version1.2, dated 29Aug2012.

From:	Andrews-Spilman, Anika
To:	Brizzolara, David; Steve_Mars@fws.gov; Motter, Allan; Hamill, Nancy
Cc:	Mark Renna (MRenna@evergreenenv.com)
Subject:	RE: Evergreen Whale Creek Mitigation Bank Sediment Sampling Plan Review
Date:	Tuesday, December 6, 2016 3:18:16 PM

Hello All,

I received comments from Nancy Hamill of the ETRA group today relative to your recent submission. Please note the following. Please contact me with any questions that you may have and I will reach out to Nancy on your behalf.

ETRA fully concurs with the USFWS comments and offers the following additional comments/recommendations:

1. The final report should provide comprehensive data (14 previous, 10 current samples) in tabular format, with comparison to both the ER-L and ER-M sediment screening criteria. Detection limits/reporting limits should be provided for each sample to ensure the screening criteria are achieved. Similarly, a sample location map such as "Figure 1" should show all previous and current locations (with sampling dates, depths indicated) and preferably include chemical data boxes for data that exceed screening criteria. Site-wide summary statistics (mean, UCL, etc.) should be reported.
2. The USFWS recommendations for PCB congener and dioxin analyses should be followed. Notwithstanding NJDEP's guidance allowing a subset of samples to be run for these analyses, ETRA consistently recommends that wetland mitigation/restoration projects involving USFWS and/or DEP LURP should follow these recommendations for these analyses; the Ecological Evaluation Technical Guidance (EETG) was written for listed contaminated sites in the LSRP Program, under N.J.A.C. 7:26E.
3. ETRA concurs with the USFWS recommendation for 3 co-located sediment and mummichog tissue samples One of the locations in the figure "marked up" by USFWS appears to be northern *Phragmites* area, and it is unclear flowing water/fish are present. HDR should ensure that a minimum of 3 paired samples are collected. Tissue data should be compared with critical body residue (CBR) reference values (aka tissue residue effects levels). CBRs for key contaminants are available in the 2014 FFS for the "Lower Eight Miles of the Lower Passaic River" Appendix D, Table 4-13, available at www.ourpassaic.org. Additional references are available, such as*: Jarvinen, A.W. and Ankley, G.T. 1999. Linkage of effects to tissue residues: development of a comprehensive database for aquatic organisms exposed to inorganic and organic chemicals. Pensacola, FL: Society of Environmental Toxicology and Chemistry (SETAC). 364 pp*. Fish tissue data could also be used in food web/dietary models for upper trophic level wildlife, but I suggest consultation with USFWS before implementation.

Nancy E. Hamill
Research Scientist
Bureau of Environmental Evaluation and Risk Assessment
Mailcode: 401-04M
P.O. Box 420

Trenton, NJ 08625
Phone: 609-633-1353
Fax: 609-292-0848

Anika

Anika Andrews-Spilman, Envl. Specialist 3
DLUR Mitigation Unit, Bureau of Technical Services
609-984-0921 phone
609-777-3656 fax
501-02A
P.O. Box 420
Trenton, NJ 08625-0420

From: Brizzolara, David [mailto:David.Brizzolara@hdrinc.com]
Sent: Thursday, November 10, 2016 5:07 PM
To: Andrews-Spilman, Anika <Anika.Andrews-Spilman@dep.nj.gov>; Steve_Mars@fws.gov; Motter, Allan <Allan.Motter@dep.nj.gov>; Hamill, Nancy <Nancy.Hamill@dep.nj.gov>
Cc: Mark Renna (MRenna@evergreenenv.com) <MRenna@evergreenenv.com>
Subject: Evergreen Whale Creek Mitigation Bank Sediment Sampling Plan Review

Hello,
As discussed at the IRT meeting on September 29, attached is the sediment sampling plan for additional sediment samples at the Evergreen Whale Creek Mitigation Bank site. Should any methodology, analyses or techniques not be satisfactory, please provide recommendations on how to revise the plan. Our schedule is to obtain sediment samples by November 29, 2016. We request your comments or approval by November 22, 2016.

A hard copy of this attachment will also be sent to your offices in the mail. Should anyone have any questions, please do not hesitate to contact me. Thank you!

Dave Brizzolara
Environmental Scientist

HDR

One International Boulevard

10th Floor, Suite 1000

Mahwah, NJ 07495
D 201.335.9341 **M** 845.570.7890
david.brizzolara@hdrinc.com

hdrinc.com/follow-us