# MANGROVE ECOSYSTEM ASSESSMENT
# GRAEME HALL NATURE SANCTUARY
# BARBADOS

Prepared for:

Graeme Hall Nature Sanctuary, Inc.
Main Road
Worthing
Christ Church
Barbados

Prepared by:

Environmental
Engineering Consultants, Inc
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## SIGNATURE PAGE

Enclosed please find a report detailing investigations by Environmental Engineering Consultants, Inc. of the Graeme Hall Nature Sanctuary (Sanctuary) in Worthing, Christ Church, Barbados. Investigations included sampling of sediments for chemical and benthic analyses and of surface water for chemical analyses. Also included were field reconnaissance and a review of previous drainage studies to help ascertain sources and quantities of flow into the Sanctuary. The investigations were performed at the request of the Sanctuary. This report has been prepared by Environmental Engineering Consultants on behalf of the Sanctuary in accordance with standard scientific and engineering practices.

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## Executive Summary

On April 12, 2006, the Government of Barbados placed the Graeme Hall Swamp on the international Ramsar List -- so named after Ramsar, Iran, where the first Convention on Wetlands was held in 1971 -- to be protected as a Wetland of International Importance. The Ramsar designation describes Graeme Hall as a "naturally created coastal wetland area with mangrove forests, a seagrass bed, and a shallow near shore coral reef, which includes a 12-acre artificially-created lake that constitutes the largest body of inland water on the island." The designation further hails a waterfowl habitat with 84 bird species and more than 20 freshwater and brackish-water fish species.

This unique ecosystem is a natural resource worthy to be protected for future generations. Private investors in the Graeme Hall Nature Sanctuary have undertaken this task while extending opportunities for public education, scientific research, and ecotourism. The venture began with the acquisition of 34.25 acres of wetlands in 1994, followed by construction of visitor center infrastructure between 1998 and 2004 and further capital improvements to the property between 2006 and 2008.

During this endeavor, however, the Sanctuary has experienced inflows of untreated stormwater, agricultural, and commercial runoff and emergency raw sewage discharges into the lake system, curtailment of seawater interchange, and frequent fish kills and recent crab kills. Concerns over these degradations prompted the Sanctuary to initiate this study of the environmental health of the Graeme Hall Mangrove Ecosystem.

In February 2010, the Sanctuary authorized Environmental Engineering Consultants, Inc. (EEC) of Tampa, Florida, to perform field investigations including sediment sampling for benthic and chemical analysis; surface water sampling for chemical and bacteriological analysis; sampling of fish and crab for chemical and pathogen analysis; surveys of onsite biological indicators; and site reconnaissance for surrounding activities impacting the Sanctuary.

This report describes how the absence of a drainage outlet and periodic tidal influences is compromising the environmental health of the wetland within the Sanctuary, erasing the brackish characteristics that are the signature of a flourishing mangrove community. It explains the increasing disappearance of a diverse community of plant and animal species as a result of assimilating and processing pollutants from upland stormwater runoff, direct pollutant discharges, and unmitigated discharges of raw sewage.

The business mandate of the Sanctuary requires a healthy and diverse ecosystem. As of this writing, the resource has been closed to the general public since March 2009 because of the apparent environmental degradation of its wetland due to pollution source points outside its boundaries. Major reinvestments in interpretative educational systems and environmental control infrastructures are now required in response to recent core changes in the wetland from a brackish to a freshwater system. Findings in this report also suggest the need for corrective measures to control external sources of contaminated stormwater, sewage, and chemical pollutants and to restore biodiversity to the wetland.

The Sanctuary has appealed without success for protections of the ecosystem that only the Government of Barbados can enact and manage.

Through inaction and failed policy, the Government of Barbados has

- permitted contaminants from throughout the catchment area to penetrate "protected" wetlands through groundwater and surface water;
- so neglected maintenance and appropriate operations of a sluice gate at the outlet of the Graeme Hall Bisecting Canal that the device has become inoperable, preventing critical tidal flow into the Sanctuary and discharge of urban stormwater runoff;
- allowed raw sewage to bypass existing sewage systems to infiltrate the Sanctuary, without remediating its deleterious effects;
- operated the sewage treatment plant and local drainage systems, in fact, without a plan or a physical design to prevent such degradation to environmental health; and

- approved plans for residential and commercial development up to the boundaries of the Sanctuary such that future environmental impacts will further threaten its very existence.

This report documents the consequences of those Government practices and omissions, as well as numerous other conditions that jeopardize the existence of the Graeme Hall ecosystem. The water and sediment quality, mangrove assessment, benthic community analysis, drainage investigation, and field observation have led to the following conclusions, explained further in this report:

- **Urban and agricultural runoffs are concentrating pollutants in the water column and sediments of the lake, ponds, marsh and canal systems of the Graeme Hall Swamp.** Future land use changes north and east of the Graeme Hall ecosystem will reduce buffering and bring more pollutants to the Ramsar wetland, which is already deprived of an outlet to the sea.
- **Average salinity in the Sanctuary's mangrove lake has declined from 8.4 ppt in 2002 to 1.9 ppt in 2010, a 77% reduction that correlates with a 75% sodium reduction.** Brackish water is a defining characteristic of the estuaries where most mangrove ecosystems are found worldwide; their salinity is typically an order of magnitude higher than the lake water results at Graeme Hall.
- **Almost every biotic and abiotic indicator points to a freshwater transformation of the mangrove wetlands.** In the absence of brackish water and tidal fluctuations, nearly all of the flora and fauna that typically live in the intertidal zone on red mangrove roots were missing.
- **Lake tributaries were oxygen-poor and high in nutrients, a combination associated with algae overgrowth and low water quality.** The relationship between runoff and water degradation is likely related to recurring fish kills.
- **Water quality analyzed from the Sanctuary and its surroundings in numerous instances, violate proposed Barbadian standards for the protection of the environment and public health.** Poor water quality reflects the lack of a regular influx of seawater and the inability to discharge excess rainfall runoff to the sea. Pesticides have

been detected in the water column and sediments at the Sanctuary and in high concentrations at locations outside of its boundaries.

- **The low biodiversity of the Sanctuary's benthic community, as indicated by taxa and individuals observed, represents a critically endangered Mangrove Ecosystem.** The invertebrate community was composed exclusively of freshwater instead of saltwater species. Analysis also revealed that some disturbance -- likely a sudden change in water chemistry -- had caused the death of otherwise healthy gastropods.
- **The existence of a high-volume emergency raw sewage discharge system into the Ramsar wetland and the Sanctuary presents an ongoing threat to water quality, the wetland ecosystem, and human health.**
- **The dysfunctional Government-owned sluice gate increases the flooding potential for the Sanctuary and adjacent lands.** Lack of operation also prevents the Sanctuary from alleviating low surface water levels during drought.
- **The lack of a drainage outlet and tidal exchange mechanism encourages freshwater competitors to the red mangroves, substantially increasing the risk of loss of a mangrove forest that has been documented to exist for no less than 1,300 years.**

Not only the business enterprise of Graeme Hall Nature Sanctuary, but the Ramsar Mangrove Ecosystem's survival depends on reversing these harmful trends and preventing future negative impacts.

## Introduction

Barbados is a small island of 430 square kilometers with a population of about 280,000, located approximately 160 km east of the Lesser Antilles island chain in the southeastern Caribbean. The Graeme Hall Nature Sanctuary is on the southwestern coast, immediately north of Highway 7 in Worthing, Christ Church. It is located within the Graeme Hall Mangrove Ecosystem, a site protected under the Convention on Wetlands of International Importance (the "Ramsar Convention," Ramsar, Iran, 1971). Barbados ratified the Convention Treaty on April 12, 2006, and designated Graeme Hall on the Ramsar List of Wetlands of International Importance for its migratory bird habitat.

The Sanctuary and the Ramsar site are fully encompassed within a 100-year floodplain. Approximately 14+/- acres in the Sanctuary are surface water and 16+/- acres are wetlands, including shallow ponds and a 12-acre lake. (See Attachment 1 for vicinity map and Attachment 2 for Ramsar site boundary.) The wetland is a Barbados National Heritage Site and one of two Caribbean Coast Marine Productivity Program (CARICOMP) sites established in Barbados to monitor ecosystem changes within the Mangrove Ecosystem and adjoining seagrasses in the St. Lawrence Lagoon.

The Ramsar designation (Attachment 3) describes the Graeme Hall location at 13°04' N, 059°35' W as a "naturally created coastal wetland area with mangrove forests, a seagrass bed, and a shallow near shore coral reef, which includes a 12-acre artificially-created lake that constitutes the largest body of inland water on the island." The designation further notes 84 bird species and more than 20 fresh and brackish water fish species. Radiocarbon dating reported by Ramcharam (2005) indicates that red mangroves have dominated the wetland for at least the past 1,300 years.

On no other location on the island can a mangrove wetland, a seagrass bed, and a shallow nearshore hard coral reef be found in close proximity. The purpose of the Sanctuary is not only to preserve this unique ecosystem, but also to utilize its value for education, scientific research, and ecotourism. Without a healthy ecosystem, ecotourism cannot flourish and the Sanctuary cannot operate under its business mandate.

The Sanctuary in recent years has experienced inflows of untreated stormwater, agricultural, and commercial runoff and emergency raw sewage discharges into the lake system, curtailment of seawater interchange, and frequent fish kills and recent crab kills. Concerns over these conditions prompted the Sanctuary to initiate this study of the environmental health of the Graeme Hall Mangrove System.

## Scope of Work

In February 2010, the Sanctuary authorized Environmental Engineering Consultants, Inc. (EEC) of Tampa, Florida, to perform the investigations at Graeme Hall Nature Sanctuary, Inc. Field investigations included sediment sampling for benthic and chemical analysis; surface water sampling for chemical and bacteriological analysis; sampling of fish and crab for chemical and pathogen analysis; surveys of on-site biological indicators; and site reconnaissance for surrounding activities impacting the Sanctuary.

Environmental Engineering Consultants (EEC) has been involved in scientific and engineering studies of water, soil, and air for private and public-sector clients since it was established in 1979. The firm has been recognized in Tampa for its pro bono contribution of groundwater studies at the Sulphur Springs Pool, which traced the source of bacterial contamination to urban stormwater runoff into upstream sinkholes. In 1988 the Greater Tampa Chamber of Commerce named EEC the Small Business of the Year.

EEC's principal investigator on site was Richard Pryor, a professional geologist specializing in water quality investigations of both surface and groundwater. Mr. Pryor has 25 years of experience in geology and environmental consulting, including more than 20 years at EEC. He has performed numerous surface water and groundwater investigations and is knowledgeable about U.S. Environmental Protection Agency (EPA) water quality test methods. His past projects include industrial contamination, stormwater runoff, wastewater effluents, underground tank leaks, and wastewater reuse studies.

Mr. Pryor was accompanied in the field by Mr. Angelo Tulimieri, a consulting environmental scientist with a specialty in wetland systems analysis.  Mr. Tulimieri also has experience in wetlands management from a regulatory perspective, having served as an environmental scientist for the Environmental Protection Commission of Hillsborough County.  Since 1991, he has delineated tens of thousands of linear feet of wetland lines, which required a comprehensive knowledge of wetland plants, wetland hydrology, and wetland soils.  He has written more than 2,000 qualitative wetland monitoring reports for review and approval by local, state, and federal regulatory agencies. He previously served as a naturalist guide for Hillsborough Community College (HCC), teaching students about mangrove ecology and benthic sampling at Upper Tampa Bay Park and at HCC's Environmental Study Centers on Cockroach Bay, located within mangrove swamps on the Tampa Bay estuary.

Robert Wallace, founder of EEC, participated in research at Graeme Hall Nature Sanctuary and contributed to the final report.  Mr. Wallace is registered as  a professional engineer in Florida, Georgia, Alabama, and Tennessee and has more than 35 years of experience in civil and environmental engineering.  His projects include domestic wastewater treatment and disposal, industrial treatment and disposal, stormwater attenuation and treatment design, stormwater runoff studies, wetland mitigation and reuse studies, and water quality studies.  Mr. Wallace was elected in 1994 to the Florida House of Representatives representing Hillsborough and Pinellas counties and served until 2002 under constitutional term limits.

Resumes for key personnel are shown at the end of the Attachments.

## Site Conditions and Surroundings

### Background

Some of the history of the Graeme Hall Swamp as researched by the Sanctuary is included here:

> Graeme Hall Ecosystem has been highly impacted by anthropogenic activities during the last 150 years. A coastal roadway was first built on the sand bar separating the mangrove swamp from the sea in the early 1700s, and the bridge over the main north-south channel, which remains today, was built in 1871. Originally, during this period, the economic needs of the Graeme Hall sugar plantation, on whose lands the swamp lay, further reduced its size and eventually led to the creation of a system of canals on the eastern side of the swamp, known locally as 'vales'. Sugar cane was grown here, as were grasses, which were used to provide forage for mules and oxen used on the plantation.
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> The latter part of the century saw the introduction of gun clubs at Graeme Hall. It was the practice of these shooting swamps to clear-cut the mangroves so that migrating birds would have a clear view of the water trays (shallow ponds) and be enticed to fly down. As part of the Graeme Hall Estate, the freshwater marsh was extensively altered by canalled water flow into a series of freshwater trays to attract water birds for shooting, and high grass banks from which mule fodder was cut and sold. Peat and mangrove poles were also known to have been cut and sold. Sometime later, a second hunting club was established in the western quadrant, and a number of shallow ponds were cleared and maintained to attract water birds. There was also an annual cutting of the surrounding mangrove trees. A sluice gate was installed in the narrow exit channel between the swamp and the sea in the 1930s and was opened only at low tide to control the water level in the shooting pools. Tilapia were introduced to the main lake around this time, and commercial seine harvesting took place. In 1972, the main lake was dredged and the cuttings were used to fill in the western ponds and convert the land to pasture. The extensive annual mangrove cutting in the swamp ceased in the 1970s, and shooting in the swamp has been banned since 1981.
>
> In the western quadrant of the Ecosystem, a shallow, roughly rectangular (150 m X 120 m) brackish lake is surrounded by a dense fringe of red (Rhizophora mangle) and white (Avicennia racemosa) mangroves. A detailed survey shows that the shores of the lake drop rapidly to a depth of 1 m or more, except along the northeastern shore which remains very shallow (<0.5 m) due to the presence of a deep layer of soft mud. The average depth of the lake is 1.32 m and the maximum depth is 2.71 m. Red mangroves dominate much of the lake shoreline, although white mangroves dominate the northeastern shore and are also found in isolated clusters along the southern boundary of the ecosystem. A freshwater marsh is located in the eastern quadrant of the swamp, which contains a large stand of mature white mangroves and a network of man-made drainage canals with lotus and water lilies, water lettuce, and filamentous green algae. The banks of the canals support a dense growth of sedges and strips of grassland.

Private investment in Graeme Hall Nature Sanctuary, Inc. began with acquisition of 34.25 acres of wetlands in 1994, followed by construction of visitor center infrastructure between 1998 and 2004. Further capital improvements to the property occurred between 2006 and 2008. The Sanctuary today has underground utility infrastructures, including sewerage, water, electrical, data/voice communications and security systems; civil works, including foot and vehicular bridges, paved walkways and over-water decks; a car-park area; maintenance and storage buildings; office trailers; and two large constructed aviaries. Other improvements include a water treatment facility for the avian captive breeding program, water storage cisterns, a greywater treatment system to recycle irrigation water, and a site-based stormwater drainage system with improved drainage swales and retention and detention areas. (See Site Plan in Attachment 4A.)

## Site Description

The 34.25 acres belonging to the Sanctuary occupy the western portion (42%) of the 81.11-acre Ramsar wetland; the Government of Barbados owns the remainder. A stormwater ditch runs along the Sanctuary's western and southern property boundaries. The north-south Graeme Hall Bisecting Canal, defining the east boundary, drains the entire ecosystem and flows southward.

Northwest of the Sanctuary is Amity Lodge, a residential area with household grey- and blackwater disposal systems discharging to the surficial aquifer that flows to the ecosystem. Small businesses, hotels, restaurants, and some residences line the north and south sides of Highway 7. Stormwater rainfall and contaminated runoff from businesses north of the highway drain to a swale/drainage ditch system that flows eastward through the Sanctuary into the Bisecting Canal.

East of the canal and within the Ramsar site/100-year floodplain is a marsh owned by the Government of Barbados. Mangroves dominate the southwestern portion of the Government property; the northern and eastern areas are spikerush. The spikerush marsh is periodically cut and trenched to allow for more open habitat for fish that control insects and for better drainage to the canal, which is connected to the marsh by ditches and culverts. The South Coast Sewage Treatment Plant, completed in 1997, lies immediately outside the northeast corner of the spikerush marsh and adjacent to the Ramsar site.

The Government of Barbados owns and operates about 160 acres of agricultural lands north of the Mangrove Ecosystem and outside the 100-year floodplain. These lands drain to the spikerush marsh and west into the Bisecting Canal. Groundwater recharge from the fields flows to the ecosystem in the surficial aquifer. In 1988 the Barbadian National Physical Development Plan set aside this agricultural area as a greenbelt buffer around the Mangrove Ecosystem to protect it from urban impacts. (See Attachment 4A for Site Plan with Surface Water Inputs.)

Within the Sanctuary, the lake, canal, and two “trays” (shallow ponds) support an ecosystem consisting of migratory birds, fish, crabs, mangrove, spikerush, trees and shrubs, and numerous other flora and fauna. The 12-acre lake lies in the central area, bordered by a mangrove stand to the north and east. On the west side, two small mangrove islands are heavily roosted by egrets. Springs in the northwest corner of the property supply water to two freshwater ponds that feed the lake by overland flow. West of the lake is a tray -- traditionally referred to as the “brackish tray” -- that receives water pumped from the lake and overflow from the freshwater tray immediately to the south. Water pumped from the springs supplies the freshwater tray. East of the freshwater tray lies the south pond, which connects directly to the southwest and southeast corners of the lake. (See Attachment 4B for the relative locations of these elements of the Sanctuary.)

Below-normal rainfall was recorded in Barbados for December 2009 and January and February 2010. Average annual rainfall in the coastal regions of the island varies from 1100 mm to 1300 mm. (See Attachment 5 for rainfall data.) During the dry period, the spring was the main source of water for the lake and trays. The lake was approximately 0.7 m (2 ft) below normal seasonal high water levels, based upon biological indicators. The brackish tray was virtually void of standing water, the freshwater tray had less than 0.15 m, and the south pond and stormwater ditch each had about 0.3 m (1 ft) of water. The only direct connections to the Bisecting Canal appeared to be the eastern extent of the southern stormwater ditch and the southeastern corner of the lake. During wetter periods, surface water levels rise and the two halves of the ecosystem interconnect as water backs up through the Bisecting Canal and flows through the mangrove stand along the eastern and northern shores of the lake.

Historically, multiple open natural and later manmade channels connected the lake and the Graeme Hall ecosystem with the sea. Over time, the wetland-to-sea channels have been reduced to just one, the Bisecting Canal. Discharge from the canal into the Caribbean Sea is currently blocked downstream by an inoperative sluice gate located immediately inland from the shoreline.

It has been reported that the sluice gate was opened several times a month in the 1980s and 1990s, not only to allow for drainage of stormwater from the ecosystem, but also in periods of high tide to allow seawater to enter the lake. The Government's Drainage Unit managed the sluice gate under the jurisdiction of the Ministry of Public Works. The Drainage Unit since has been reorganized under the Ministry of Environment, Water Resources and Drainage.

The sluice gate -- the main drainage path from the Graeme Hall wetland and Ramsar site -- has not been operational since 2006, when wooden components rotted to the point of failure. (See photos in Attachment 6.) Since 2006, the Government of Barbados has attempted to manage wetland water levels and allow flows within the Bisecting Canal by removing sand with a front-end loader and backhoe. The staff of the Sanctuary reported that the canal was last allowed to drain off water in August 2009, when government staff manually jacked open the sluice gate and excavated a trench through the beach sands to the open water. This was believed to be the only opening of the sluice gate in 2009.

## Barbados Stormwater Drainage Study

Cumming Cockburn Limited, et al., under contract to the Government of Barbados, estimated the flood levels of the Graeme Hall ecosystem in the 1996 Barbados Stormwater Drainage Study. According to the study (see Table 2-6 in Attachment 7), a 100-year storm of 24-hour duration would achieve an elevation of 1.60 m, assuming the normal water level of 0.40 m at the outset of the storm with no outflow during the event. Table 2-6 also shows the estimated flood levels from 3-hour and 24-hour storms for recurrence intervals of 2, 5, 10, 20, 50, and 100 years.

The Barbados drainage study recommended a monitoring program to record lake water levels, gate operation, and outflow volumes. To EEC's knowledge, this has not been undertaken; nor have the study's other recommendations been followed. The study recommended flood proofing via a berm raising the perimeter of the ecosystem to elevation 1.6 m (pages 3-24 and 3-25) and extending the concrete-lined outlet of the Graeme Hall Bisecting Canal approximately 40 m beyond the existing channel, to be coupled with water jet pumps for sand removal.

The study noted that "water draining from the swamp typically has a high level of tannins, resulting in discoloration of the sea water near the outlet," and it acknowledged challenges to its recommendations: "Local tourist operations have frequently expressed concerns…about potential water quality impact on adjacent beaches."

## Geology and Hydrogeology

Barbados lies approximately 160 km east of the Lesser Antilles volcanic islands on the eastern edge of the Caribbean tectonic plate. The island is relatively flat, with its highest point just over 330 m above sea level near the center. Reef limestones were deposited on Tertiary aged deep marine strata and subsequently uplifted by subduction as the North Atlantic Plate slipped under the Caribbean Plate (Geological Society of London, 2004). The base of exposed Tertiary rocks consists of sandstones, clay, and shale. The upper part of the Tertiary, up to 1.2 km thick, is composed of Eocene to middle Miocene biogenic and volcanogenic beds of the Oceanic series.

The Oceanic series rocks are fine white clays, locally known as chalk. Shallow-water carbonate deposition began in the Pleistocene in the form of coral-reef tracts as the island was uplifted. Successively younger reef terraces have been exposed. The terraced coral cap cover is up to 100 m thick and covers most of the island, except on the far central-eastern part, where Tertiary rocks are exposed. The dominant features of the topography are two terraces described as the First High Cliff, located in the south part of the island, and the older, higher Second High Cliff, near the center of the island (Banner, J., Musgrove, M., & Capo, R.).

Rainfall averages 1100-1300 mm per year. Groundwater flow patterns in the coral cap are controlled by (1) the markedly higher permeability and porosity of the coral cap relative to the underlying Tertiary aquitard, (2) the distribution of rainfall recharge, which is greatest in the central, elevated part of the island, and (3) the topography of the Pleistocene-Tertiary contact (Banner, J., Musgrove, M., & Capo, R.). Groundwater in the area of Graeme Hall is depicted to be a freshwater lens approximately 15 m thick and extending about 6 km inland, overlying saline water that extends 4 km inland. (See Attachment 8 for plan and cross-sectional views of the island.)

The Graeme Hall ecosystem occupies an 81 +/- acre relict sinkhole immediately below the First High Cliff. It is located within the Christ Church Groundwater Catchment Area, one of the largest of 19 groundwater water catchment areas in Barbados (Attachment 9, The National Natural Resources Data Base, Government of Barbados, 1998).

Within the 19 large groundwater catchment areas are smaller surface water catchment areas, based upon surface water runoff and the connection of gullies formed in the limestone. The Graeme Hall ecosystem receives surface water runoff from an estimated 1,156 acres of the Hilbury Watershed (Government of Barbados, Gully Ecosystem Management Study, 2004). After filtering and deposition through the ecosystem, the surface water runoff and groundwater discharges flow into the Graeme Hall Bisecting Canal.

Two freshwater springs are located on the northwest corner of the Sanctuary. At least one spring has been reported in the marsh east of the Bisecting Canal (University of West Indies, 2004). Freshwater irrigation wells are reported to exist on Ministry of Agriculture lands immediately northeast of the Sanctuary. Upland recharge and groundwater flowing through the coral cap supply freshwater to these wells and springs.

Groundwater and coastal water quality throughout Barbados is influenced by urban, commercial, industrial, recreational, and agricultural activities and the coral limestone underlying the island, which is highly permeable (Arriola, 2008).

Barbados' groundwater protection zones (Attachment 10) are designed to protect public water supply sources from bacteriological contamination. The Graeme Hall ecosystem and associated catchment area lie within Zone 5, which currently has no restriction for physical development. Blackwater and graywater are routinely discharged into the limestone through suckwells. Surface water directed to the ecosystem consists of rainwater runoff of varying quality, based upon precipitation rates, land use, and discharge practices. Similarly, groundwater quality of percolated rainwater varies with the pollutant load, precipitation rates, and filtering capacity of the underlying limestone.

## Mangrove Quality Assessment

This report addresses the qualities of the mangrove wetland and 12-acre lake (mangrove-lake ecosystem), based on field information collected February 7-14, 2010. Changes within the Graeme Hall Nature Sanctuary are described by Angelo Tulimieri in Attachment 11. More on the dominant flora and fauna, as well as wetland definitions and mechanisms, can be found in the full report. In Attachment 12, the former chief naturalist at the Sanctuary, Ryan Chenery, provides an inventory of birds observed February 8-13, 2010, as well as a historical account of the Sanctuary garnered over a 5-year period.

An ecosystem is the interaction of living (biological) components with nonliving components (i.e., water and sediment quality) within a scaled boundary, as well as an exchange of energy, materials, and organisms across that boundary. This report addresses the biological changes in the Sanctuary's mangrove-lake ecosystem that are related to a freshwater transformation. Indicators of this transformation, such as salinity measurements and benthic community analysis, are derived from other parts of this report.

Historically, water flowed in both directions across the Sanctuary's mangrove-lake ecosystem boundary when the sluice gate was regularly opened to the sea. For at least the last 3.5 years, only freshwater has entered the ecosystem. This water departs via seepage, evaporation, and evapotranspiration. Organic wastes enter the mangrove-lake ecosystem via drainage basin runoff or are generated from within the ecosystem. Some of the organic wastes are converted to nutrients and biomass via biogeochemical cycles; the degree of conversion was not measured in this study. In a normal mangrove wetland, some of the generated biomass and nutrients flow out to sea with tides. Wastes other than organic matter enter the ecosystem boundary; among them are organophosphate pesticides, for which no comparable biogeochemical cycling is readily available and which may be lethal, depending on the concentration.

Normal mangrove wetlands -- synonymous, for purposes of this report, with mangrove forest and mangrove swamp -- provide important functions. They are very effective at converting wastes into minerals and nutrients for biomass production. They provide nursery grounds and breeding sites for various species, including birds, fish, crustaceans, reptiles, and mammals (Alongi, 2002). They provide nutrients to nearshore fisheries, seagrasses, and coral reefs. Mangroves have been shown to act as a vegetative buffer zone between disturbed freshwater sources and coastal water (Lin, 2004).

By definition, mangrove wetlands inhabit brackish water and dominate the area between the highest and lowest tides, i.e., the intertidal zone. One way to classify mangrove wetlands is by their position along a salinity gradient, with salinity decreasing the closer the mangroves get to their freshwater source, such as when they begin to move into rivers from estuaries. An estuary is an embayment where freshwater and saltwater mix, resulting in brackish water with salinities of 5-30 ppt. This is the expected range of salinity for a healthy mangrove ecosystem that supports saltwater flora and fauna. The average salinity in the Sanctuary’s mangrove-lake ecosystem was found to be 1.9 ppt, which is considered freshwater. Mangroves survive well in freshwater, yet mangrove forests don’t emerge there because of freshwater plant competition.

According to research by Simberloff (1983) and Tomlinson (1986) as reported on the Smithsonian Web site, "One reason mangroves do not develop in strictly freshwater communities is due to space competition from freshwater vascular plants. By growing in saline water, mangroves reduce competitive threat, and thus are able to dominate the areas they grow in.”

In 1986, Christopher Parker from the University of West Indies found water salinity in the Bisecting Canal in the range of 29-34 ppt, which indicated a seawater connection. The salinity reading in the canal was 1.3 ppt in February 2010. Salinity results are in the Surface Water Quality section of this report.

The wetland hydroperiod in the Sanctuary’s ecosystem resembles that of an isolated freshwater wetland. Normal mangrove wetlands develop in intertidal zones, areas between the highest and lowest daily tides, and or in subtidal zones that are saturated daily with brackish water. It was evident that water levels in the Sanctuary mangrove ecosystem change slowly in the absence of daily tidal fluctuations and that the water levels were well below the level of the historic low tide. A severe drought had been in effect since at least December 2009.

By definition, wetlands are less than 3 m in depth, since this is the maximum depth in which vascular wetland plants such as waterlily can root. Graeme Hall contains the following wetlands within the Sanctuary and the Government-owned land:

- The Sanctuary's mangrove wetland, which is reportedly one of the largest and most significant of its kind in Barbados and which constitutes the major portion of the mangroves within the preserve.

- The two waterlily (*Nymphea*) ponds in the northwest corner of the Sanctuary, just outside the white mangrove portion of the forest. Each is dominated by a different species of waterlily; one pond also supports a significant amount of spikerush (*Eleocharis mutata*), which is in the sedge family (*Cyperacae*).
- The freshwater marsh on Government property, consisting of an almost monoculture of the same spikerush.
- The Bisecting Canal, which was supporting emergent freshwater vascular plant species.

Whereas wetlands are surface waters, not all surface waters are wetlands because not all surface waters support wetland vegetation. Swamps are wetlands dominated by wetland trees; marshes are wetlands dominated by wetland herbs. Classically, three parameters define a wetland: wetland hydroperiod, wetland plants, and wetland soils. Surface waters lack wetland plants and wetland soils.

The surface waters found at Graeme Hall included but were not limited to several ditches inside and outside the Sanctuary boundaries, as well as four open water bodies in the Sanctuary as follows:

- The Sanctuary's 12-acre lake, which is shallow enough to permit the growth of freshwater vascular plants; these were absent, possibly because of the tilapia -- voracious herbivores -- that thrive there.
- The small pond, connected to the south side of the lake at two points.
- The temporal freshwater pond or tray on the west side.

The temporal "brackish" tray, so named before the end of seawater inputs.
Water levels in the surface waters mentioned were below normal when first encountered on February 8, 2010. The stain line on the red mangrove roots around the lake indicated that the water level was as much as 0.6 m below normal. At the same time, water levels in the two "trays" were below ground. These trays have very shallow bottoms that are as much as several feet higher than the lake bottom.

In periods of drought, the Sanctuary pumps freshwater from the springs to assist with hydration. Such pumping occurred during the monitoring event, and subsequently the freshwater tray, but not the higher "brackish" tray, filled with water. Although no overland connection between the pump(s) and the lake was found, the lake water rose by several centimeters without the aid of rainfall. It was also noted at the end of that week that soils were saturated around the white mangrove pneumataphores on the north side of the Sanctuary’s mangrove forest at an intermediate elevation. The pneumataphores would have developed during periods when this area was wetter.

Two small red mangrove islands in the lake have been in constant use by wading birds, primarily egrets. The future of these islands is uncertain, as the lower branches on the red mangroves there were dead, and attempts to replant them were reported to have been less than successful. Mangroves are known for their island building ability, but in the absence of daily tidal fluctuations, the islands’ soils could be subsiding. Their loss would be very detrimental to the wading birds that find protection there from local predators such as mongooses and monkeys. There are also two small mangrove islands in the so-called brackish tray, but their bottom elevations appeared to be perched above the mostly empty bottom of the tray, and there was relatively no wading bird activity there.

The Bisecting Canal inside the eastern edge of the Sanctuary crosses under Highway 7 and stops a few meters short of the sluice gate, bifurcating the Graeme Hall mangrove forest with one part inside the Sanctuary and the other inside Government-owned land. The canal was filled in large part with arrowhead (*Sagittaria*) and waterlily plants.

The following table identifies the major plant species associated with the Graeme Hall wetlands.

**Graeme Hall Sanctuary's Most Important Wetland Plant Species**

| Habit | Scientific Name | Common Name | Wetness Rating | Location |
|---|---|---|---|---|
| Tree | *Conocarpus erectus* | Buttonwood | FACW | Upper white mangrove forest |
| Tree | *Ficus citrifolia* | Bearded fig | FAC / FACU | Disturbed edges of Sanctuary mangroves |
| Tree | *Laguncularia racemosa* | White mangrove | OBL | Sanctuary mangrove forest |
| Tree | *Rhizophora mangle* | Red mangrove | OBL | Sanctuary mangrove forest |
| Shrub | *Cordia obliqua* | Clammy cherry | FAC? | Disturbed edges of Sanctuary mangrove |
| Herb | *Cladium jamaicense* | Sawgrass | OBL | Government marsh |
| Herb | *Eleocharis mutata* | Spikerush | OBL | Government marsh + north lily pond |
| Herb | *Nymphea odorata* (exotic) | Waterlily | OBL | North lily pond |
| Herb | *Nymphea ampla* (native) | Waterlily | OBL | South lily pond |

Remarks:
(OBL) Obligate wetland species occur more than 99% of the time in wetlands.
(FACW) Facultative wetland species occur in wetlands 67-99% of the time or in uplands 1-33% of the time.
(FAC) Facultative species occur in wetlands or uplands 34-66% of the time. They tolerate wet and dry conditions.
(FACU) Facultative upland species occur in uplands 66-99% of the time or in wetlands 1-33% of the time.
(UPL) Upland species occur more than 99% of the time in uplands.

The Sanctuary mangroves, verdant and healthy, were found in textbook zonation patterns: red mangroves at the lower, wetter elevations and white mangroves at the higher, drier locations. Red mangroves dominated in terms of area, whereas white mangroves tended to dominate in height, some being upwards of 20 m. The median red mangrove height around the edge of the lake appeared to be about 5-6 m, with some red mangroves appearing to reach about 10 m. Buttonwood (*Conocarpus erecta*) was located in the more elevated parts of the white mangrove forest but provided less than 5% coverage overall. Bearded fig (*Ficus citrifolia*), a tall tree with a wide canopy, was found near white mangroves at comparable or slightly higher elevations in disturbed soils that were dry or moist. Its seedlings were found in some moist soils, which is consistent with their wetness rating as a facultative or transitional species.

On Government land, a red mangrove forest was surrounded and in some places infiltrated by freshwater spikerush, which left scattered patches of red mangroves. The exposed soils in the marsh varied from moist, to saturated, to inundated by what appeared to be shallow water.

Laboratory analysis of the benthic community in the lake found that all of the saltwater macroinvertebrates had been replaced by freshwater species: segmented worms (Annelida), freshwater snails (Mollusca), and freshwater insects (Arthropoda). Analysis also revealed that the benthic community had experienced a disturbance that caused the death of snails or gastropods, attributable to a sudden change in water chemistry.

No intertidal community was encountered on the mangroves within Graeme Hall. In a healthy intertidal mangrove ecosystem, algal collars composed of fungus and chlorophyte filaments grow on the roots in the intertidal zone. Small algal collars were found on only a few red mangrove roots in the Sanctuary and Bisecting Canal. These appeared to be surviving by wicking water.

Several fauna normally associate with these algal collars in a mangrove ecosystem. These include the spotted mangrove tree crab (*Goniopsis cruentata*) and the mangrove periwinkle (*Littorina angulifera*, which were not encountered during the monitoring event and may be considered a missing part of the food chain. Ryan Chenery reported that he had never seen them in the Sanctuary. If daily tidal fluctuations were reestablished, reintroducing these species and their associates would be a method to increase diversity and enhance the food chain. The spotted tree crab, which has been found in Barbados, feeds on fallen mangrove leaves (Raulerson, 2004) and is a favorite in the ibis diet.

Blue land crabs (*Cardisoma guanhumi*) inhabit the upper parts of the mangrove forest in both white and red mangrove zones. A substantial number of blue land crab burrows in the upper part of the white mangrove zone were either abandoned or plugged in order to preserve moisture. An equal or greater number of active burrows were encountered at lower elevations, and their density or number of holes per area appeared to be high. Blue land crabs are most active at night and therefore may not be expected to be observed in daylight, when the Sanctuary was open to perform the monitoring.

Reports by Chenery and others indicate that both blue land crabs and fiddler crabs (*Uca bergersi*) have declined in numbers. A small number of fiddler crabs and their burrows were found. A historical newsletter mentioned that fiddler crabs were once so abundant that they swarmed over the Sanctuary sidewalks. Their reduced numbers may be attributable to a combination of factors, including susceptibility to pesticides. Massive fogging with malathion, an organophosphate associated with toxicity to fish species, has been reported within the Government's wetlands.

Glossy ibis (*Plegadis falcinellus*) was identified in the Sanctuary during this monitoring period. This wading bird is a tactile forager with a long curved beak adapted to probing inside fiddler crab burrows. One study in a Brazilian mangrove forest found that an ibis species there fed mostly on fiddler crabs (*Uca*) taken directly from their burrows (Olmos, et al., 2001).

During the February 2010 sampling, Chenery identified 37 bird species in the Sanctuary, including 16 migratory species (Attachment 12). Chenery also identified two wild mongooses (*Herpestidae*) entering the Sanctuary from the west. Easily spotted almost daily around the Sanctuary parking lot were several green monkeys (*Chlorocebus*), individually and in groups of up to five. In the lake, dozens of tilapia (*Oreochromis mossambicus*) and several Atlantic tarpon *(Megalops atlanticus*) were observed. Several termite nests (*Isoptera*) were found on the west side of the Sanctuary amid white mangroves, both on the ground and in tree crotches.

One freshwater species that may compete with white mangroves if given an opening is clammy cherry (*Cordia obliqua*), which was scattered around the edges. Clammy cherry is a shrub capable of reaching heights of 7-8 meters and providing significant canopy coverage. If gaps were to open in the white mangrove canopy, then clammy cherry could become established there and in time begin to dominate. Already clammy cherries were found to have infiltrated some of the white mangrove part of the forest. This may happen within the red mangrove forest as well.

Currently the interior of the mangrove forest is dense enough to prevent sunlight from reaching the forest floor. Without sunlight, nothing else can grow there, which in part accounts for the lack of plant diversity in mangrove forests. If an opening in the mangrove canopy were to occur through a fire, lightning strike, hurricane, or other event, then sunlight could penetrate and freshwater plants could invade and eventually outcompete the mangroves.

## Summary

Reports of fish kills and raw sewage inputs prompted an ecosystem study of the mangrove-lake ecosystem within the Sanctuary. Almost every biotic and abiotic indicator pointed to an advanced state of freshwater wetland transformation for the mangrove forest, which by definition should be an intertidal wetland dominated by salt-tolerant flora and fauna. Although mangroves grow well in freshwater, they have no defense against being outcompeted by freshwater plants in a freshwater environment. Examples of this were found in the Government's adjacent mangrove wetland, where patches of red mangroves were surrounded and in some places infiltrated by freshwater spikerush herbs.

In hydroperiod and water salinity, the Sanctuary mangrove wetland and lake are identical to isolated freshwater wetlands. Freshwater plants found in Sanctuary ponds and in the adjacent Government-owned wetlands were growing in water salinities only 1 ppt lower than the salinity found in the lake. The lake is shallow enough to support the growth of emergent freshwater plants, but the large number of herbivorous tilapia may be preventing this. All of the benthic saltwater macroinvertebrates have been replaced by freshwater species; in time, the same may be expected of the plants as well. Water salinities at all wetland sample stations were below the brackish water salinities required by mangroves to maintain their dominance against freshwater plants in the long term.

This transformation to a freshwater wetland threatens the very survival of a mangrove community that provides all-important habitat for Barbados' wading birds and waterfowl, of which 37 species were identified during the monitoring period, including 16 migratory species. A restoration of regular, if not daily, tidal fluctuations within the Sanctuary mangrove ecosystem would begin to restore its estuarine condition. Without reconnection to the sea, the eventual loss of the Sanctuary's mangrove ecosystem, including its wading bird community, can be expected.

The conversion from a brackish mangrove wetland to a freshwater wetland in which freshwater plants replace mangroves may take a long time; nonetheless, it could be accelerated by a major

perturbation, which may be inevitable. Such a change at Graeme Hall would permanently eliminate the mangrove ecosystem and the wading bird and waterfowl community it supports, hallmarks of this internationally recognized site.

## Surface Water Sampling

The sampling plan prepared by EEC for the 2010 event called for performing surface water and sediment sampling for chemical analysis at the same locations presented in the two initial Sanctuary Water Quality Monitoring Reports (2000-2001 and 2002-2003). However, some locations did not have sufficient surface water to sample. (See Attachment 4B for sample locations and Attachment 13 for the correlation of 2010 locations to previous locations and the rationale for choosing alternative locations.)

Richard Pryor performed the sampling in accordance with the Florida Department of Environmental Protection's Standard Operating Procedures for Field Activities, dated March 2008. Field readings were obtained within measured depths of water columns by holding respective probes within the approximate middle of the water column. The following field readings were recorded and instruments used:

- Temperature, using a Hach HQ30d
- pH, using an Oakton pH 6
- Conductivity, using an Oakton Con 6
- Dissolved oxygen, using a Hach HQ30d
- Salinity, using a YSI 63

The Government of Barbados provided containers to EEC for bacteria samples, which were collected first because of the limited 6-hour hold times allowed prior to analyses. Sampling was performed by submerging each container approximately 6 inches below surface and subsequently removing the cap until the container was close to full. Once filled, containers pre-labeled with sample name and analysis had date and time recorded and then were put on ice in a cooler. Samples were collected for:

- Fecal coliform
- Fecal streptococci
- Fecal enterococci

Bacteria samples were delivered within 6 hours of sampling to the Ministry of Agriculture, Government Analytical Services laboratory in St. Michael, Barbados.

Chemical analyses required a laboratory out of the Caribbean region. EEC selected Test America's laboratory in Tampa, which shipped empty sample containers to Barbados in coolers with chain-of-custody seals. EEC performed sampling at each station by submerging each container approximately 6 inches below surface and subsequently removing the cap until the container was close to full. Containers with preservative were not allowed to overfill. Once filled, containers pre-labeled with sample name and analysis had date and time recorded and then were put in a cooler with ice cubes double-bagged in 1-gal plastic bags. For shipping purposes, EEC maintained a chain of custody to the lab. Samples were appropriately iced and coolers were sealed with chain-of-custody seals and all appropriate shipping documentation.

Samples for chemical analyses were shipped on the day of collection to Test America's laboratory in Tampa, using FedEx Priority overnight delivery. Sample coolers all arrived at Test America two days after shipping rather than one day because of customs inspections. Sample temperatures were all within the prescribed 4° C upon receipt, as shown on the laboratory analytical receipt sheets. Laboratory analyses were performed for:

| **Nutrients and Other Water Quality Parameters** | **Metals** |
|---|---|
| Turbidity | Magnesium |
| Biological Oxygen Demand (BOD) | Sodium |
| Tannin | Chloride |
| Nitrate | Copper |
| Nitrite | Iron |
| Ammonia | Lead |

Sulfate

Sulfide

Chemical Oxygen Demand (COD)

Alkalinity

Carbon Dioxide ($CO_2$)

Chlorophyll A

Total Suspended Solids (TSS)

Chlorinated Herbicides (EPA Method 8151)

Organochlorine Pesticides (EPA Method 8081)

Organophosphorous Pesticides (EPA Method 8141)

Phosphorus

Mercury

Potassium

Sulfur

Zinc

## Surface Water Quality

### Lake and South Pond

Water in the lake was very low, based on stain lines observed on bridges and mangroves. The water level was approximately 0.6 meters below seasonally high water levels and about 1.3 m below a flood stage indicator under one of the walking bridges. The connection at the southeast corner of the lake between the south pond and the lake was unsaturated. Water depth in the south pond (S6B) was 0.16 m (0.5 ft) to 0.3 m (1 ft); depths around the edges of the lake -- S3A, S3B, S7A, S7B, and S10 -- averaged 0.5 m (1.5 ft). Temperatures averaged 29.2° C. (Complete laboratory analytical results are shown in Attachment 14. A review of field collected results and analytical data appears in Attachment 15.)

Comparisons of 2002 and 2010 water quality results indicate that these water bodies have changed from brackish to freshwater. Brackish water is defined as a mixture of saltwater, which ranges from 16 to 30 parts per thousand (ppt), and freshwater, which has 5 ppt or less of salts. Brackish water ranges from 6 to 15 ppt (Texas A&M University, 2006). In April 2002, average salinity for the five on-site water quality stations sampled within the lake and south pond was 8.4 ppt; average sodium concentration was 2,426 mg/l. In February 2010, average salinity was found to be reduced by 77% to 1.9 ppt from the six stations sampled within the lake and south pond;

average sodium concentration had diminished by 75% to 598 mg/l. (A review of historic and current data compiled for five sampled wetland and stormwater control areas is shown in Attachment 16.)

Concentrations of the analyzed dissolved metals were relatively low compared with other sampled areas. There were no occurrences of lead, mercury, or copper above laboratory detection limits and relatively low concentrations of iron, potassium, zinc, and magnesium. However, the average zinc concentration of 0.01 mg/l was higher than the recorded 2002 concentration of <0.005 mg/l. Concentrations of copper, lead, and mercury were below the Government's proposed Marine Pollution Control standards, as shown in Attachment 15. Although these standards are only proposed, they are referred to by the Barbados Environmental Protection Department and industry as compliance criteria.

Within the lake, dissolved oxygen values generally ranged from 5.99 to 8.32 mg/l. Sample location 7A in the very southeastern corner of the lake exhibited the lowest concentration, 3.17 mg/l, similar to the average recorded at this location throughout the 2002-2003 sampling period. The reading likely reflects a mixing zone of lake water with water from the Bisecting Canal and areas eastward. Samples from 3A and 7B exhibited supersaturated concentrations of dissolved oxygen -- that is, concentrations greater than the theoretical maximum for the respective temperature at atmospheric pressure. The most likely cause is that aquatic algae and plankton have produced additional oxygen through photosynthesis during daylight hours. During darkness, the reaction is reversed: Oxygen is consumed from the water, and carbon dioxide is released and dissolved as carbonic acid. Both supersaturated and low levels of dissolved oxygen can be toxic to fish.

The average biological oxygen demand (BOD) was a relatively low 4.5 mg/l. The Barbadian Government has proposed that BOD -- a measure of the amount of oxygen used by bacteria to decompose organic substances in 5 days -- not exceed 30 mg/l within a 50:1 mixing zone with discharged domestic waste. The average chemical oxygen demand (COD) was 52 mg/l. COD is a measure of the quantity of oxygen required to oxidize organic matter into carbon dioxide and water. The COD/BOD ratio of approximately 12 indicates that most of the dissolved organic matter is not easily biodegraded. While reviewing monthly data from the 2002-2003 sampling period from station 7B, EEC noted that the BOD peaked in August 2002 to 20.43 mg/l and dissolved oxygen dropped to 2.95 mg/l, coinciding with a prolonged period of hot weather and a spike in rainfall. Similarly, at S7A, BOD rose and dissolved oxygen dropped in the summer months in 2001, when 36 fish were reported killed in July and 3,000 fish killed in September.

Alkalinity averaged 440 mg/l, reflecting the limestone (calcium carbonate) geology of the island; pH averaged 8.23. Alkalinity greater than 400 mg/l is relatively high (EPA, 1988). The alkalinity of ocean water near Barbados has been reported at 120 mg/l (U.S. Department of Energy, 2006). High alkalinity provides good buffering capabilities against pH swings; thus pH values tend to remain above neutral.

Ammonia levels had declined from 0.5 mg/l in 2002-2003 to approximately 0.1 mg/l in 2010; levels in the south pond, 0.11 mg/l, were similar to the average exhibited in 2002-2003. Ammonia toxicity is enhanced by warmer temperatures, pH values over 7 su, low dissolved oxygen, and elevated zinc or copper concentrations. Different species of fish can tolerate different levels of ammonia (Tucker, 1998). While reviewing data for station 7B from the 2002-2003 sampling period, EEC noted that ammonia levels were relatively high in August 2002, pH values were near 8 standard units (su), BOD peaked, dissolved oxygen was relatively low, and temperatures were relatively high. Around the time of the reported 2001 fish kills, temperature peaked in August and September, ammonia levels peaked, dissolved oxygen was low (0.93 mg/l), and pH values were near 8 su at station 7A.

Turbidity levels averaged 5.4 nephelometric turbidity units (NTU), more than three and half times the Barbadian Government's proposed marine water quality standard of 1.5 NTU. Tiny soil particles that wash into a water body from the land often cause turbidity. These particles can contain nutrients that, when combined with water and sunlight, cause explosive growth of algae. The various substances increasing turbidity can also have a high biological oxygen demand. The highest turbidity and BOD results were observed from sample 6B from the south pond.

Nitrogen, sulfur, phosphorus, and carbon dioxide are important nutrients when analyzing the health of a water body. In general, high levels can lead to excessive algae growth and subsequent changes in dissolved oxygen content. Phosphorus levels were higher than Barbados' proposed marine standard of 0.015 mg/l, ranging from 0.11 mg/l to less than 0.1 mg/l. Nitrate concentrations were all less than 0.1 mg/l, similar to the average of the 2002-2003, and nitrite concentrations were all less than 0.1 mg/l. Sulfate concentrations averaged 150 mg/l, and chloride concentrations averaged 1000 mg/l. Carbon dioxide results averaged approximately 50 ug/l.

Fecal coliform averaged 684 colonies/100 ml; fecal streptococcus, 325 colonies/100ml -- results far in excess of the ambient marine surface water standards, which would limit fecal coliform to 200 colonies/100 ml and fecal streptococcus to 35 colonies/100 ml. Bacterial counts were similar in April 2002, also a dry period.

The trophic state classification system is designed to rate individual lakes and ponds based on the amount of biological productivity occurring in the water, as indicated by decreasing clarity and rising concentrations of chlorophyll, phosphorus, and nitrogen. In increasing order of productivity, the classifications are oligotrophic, mesotrophic, eutrophic, and hypereutrophic. Based primarily on chlorophyll-a results in the range of 30 ug/l, the lake exhibited a high level of biological productivity. Therefore, the lake and south pond may be classified as eutrophic.

Tannins and lignins averaged 1.7 mg/l, reflecting decomposition of leaf matter from the surrounding mangroves. There typically are no drinking water or surface water standards for tannins. However, based upon the high level of biological activity and the relatively high coliform concentrations outside prescribed limits, the lake is not suitable for swimming.

In summary, the lake and south pond have decreased in salinity since 2002 to the point of becoming primarily freshwater. Alkalinity is relatively high, which tends to keep pH above neutral. Dissolved oxygen, ammonia, and BOD results within the lake were for the most part good, although they are expected to degrade in summer months, based upon past results. Ammonia toxicity is directly related to elevated pH and temperatures, low dissolved oxygen, and elevated zinc and copper concentrations. The average zinc concentration in the lake and south pond rose from <0.005 mg/l in 2002 to 0.01 mg/l in 2010. Drainage and regular tidal influxes would alleviate the low dissolved oxygen readings expected in summer months, a condition associated with areas east of the Bisecting Canal, as described below.

### Bisecting Canal

The Bisecting Canal receives water from the lake, stormwater ditch, and freshwater marsh. Water from the canal either seeps into groundwater or moves into the lake or adjacent mangroves via culverts and openings in the mangroves. Water levels were low, based on stain lines observed on mangroves. Depths averaged 1 ft at the three sample locations, S8A, S11A and S12. Temperature averaged 27.3° C. The northern third of the canal was unsaturated. The sluice gate at the southern end was not operational, and culverts leading from the east were dry. (A review of field collected results and analytical data, as compared with the Barbadian Government's proposed ambient marine standards, is shown in Attachment 15. Average results for the canal, compared with other sampled areas and historic results, are shown in Attachment 16.)

Like the lake, the Bisecting Canal is exhibiting fewer saltwater characteristics and is more appropriately classified as freshwater. Results showed that salinity decreased 67% from 3.98 ppt in 2002-2003 to 1.33 ppt in 2010. The average sodium concentration decreased 66% from 1237 mg/l to 420 mg/l. Sulfate concentrations averaged 117 mg/l; chloride, 690 mg/l. Concentrations of iron, potassium, and magnesium were relatively low, and no occurrences of lead, mercury, or copper above laboratory detection limits were found. The average zinc concentration of 0.018 mg/l was greater than the 2002 average of <0.005 mg/l and marginally above the Barbadian Government's proposed ambient marine standards.

Within the Bisecting Canal, dissolved oxygen values ranged from 0.5 to 5.01 mg/l. Sample location 8A, near the northern extent of the saturated canal, exhibited the lowest concentration. Higher results near the southern end are related to mixing from the lake, which was shown to have higher dissolved oxygen concentrations. Turbidity levels ranged from 3.5 to 45 NTU, with the highest result exhibited at the southern end.

The average biological oxygen demand was less than 2.0 mg/l. The average chemical oxygen demand was 29 mg/l. The COD/ BOD ratio,  approximately 15, was similar to that of the lake, indicating that most of the dissolved organic matter is not easily biodegraded.

Nitrate concentrations were all less than 0.1 mg/l, similar to the average of 2002-2003, and nitrite concentrations were all less than 0.1 mg/l. Alkalinity averaged a moderately high 277 mg/l (200-400 mg/l, EPA, 1988), indicating a pH above neutral (readings averaged 7.48) and good buffering capabilities against pH swings. Ammonia levels declined from 0.42 mg/l in 2002-2003 to approximately 0.27 mg/l in 2010. Phosphorus levels were all less than 0.1 mg/l, and carbon dioxide results averaged approximately 112 ug/l. Chlorophyll-a results averaged 17 ug/l. Tannins and lignins averaged 1.1 mg/l. Based upon  the chlorophyll-a, phosphorus, and nitrate results, the Bisecting Canal exhibited a high level of biological productivity and can be classified as eutrophic.

Bacteria results in 2010 were lower than in the similarly dry period of April 2002. Fecal coliform averaged 67 colonies/100 ml.  The average for fecal streptococcus, 64 colonies/100ml, was marginally above the standard of 35 colonies/100 ml proposed by the Barbadian Government for ambient marine surface water quality.

In summary, the Bisecting Canal is a freshwater body and has decreased in salinity since 2002. Based on chlorophyll levels, the canal may be classified as eutrophic. Average dissolved oxygen results within the canal were moderate, reflecting an average of the east side of the Ramsar site and the lake on the west side. Nutrient and dissolved metal concentrations, with the exception of zinc, and ammonia levels were low in this relatively dry period.

### Onsite Stormwater Ditches

Connecting stormwater ditches run north to south near the western boundary of the property. The culminating ditch turns eastward at the southwest property corner and runs along the south property boundary. The ditches collect stormwater from residences and light industrial properties to the west and south, as well as runoff from the Sanctuary itself. The ditch discharges near the southern end of the Bisecting Canal. Water also backs up from the canal into the stormwater ditch system. The southern ditch lies adjacent to a large number of blue land crab burrows and an area of reported crab kills in 2009.

Water levels in the ditches were low, based upon observed floodplains, low flows, and unsaturated sections. Depths averaged 0.23 m (0.75 ft) at the four sample locations, S4B, S4C, S4D, and S4E. Temperature averaged 26.2° C. (A review of field collected results and analytical data is shown in Attachment 11.) Salinity results averaged 1.2 ppt, down 50% from 2.4 ppt in 2002, and reflected mixing from the canal and stormwater inputs. Average sodium concentration decreased 63% from 947 mg/l to 350 mg/l. Sulfate concentrations averaged 82 mg/l, and chloride concentrations averaged 523 mg/l. (A review of current and historical data is shown in Attachment 16.)

Average concentrations of the analyzed dissolved metals were highest in the stormwater ditches and an offsite stormwater swale (S4F) relative to the other areas sampled. Onsite, the results for metals from S4B primarily influenced that ranking. The sample exhibited concentrations of 0.095 mg/l for lead, 0.044 mg/l for copper, and 0.041 mg/l for zinc -- higher than the Barbadian Government’s proposed standards of 0.0044 mg/l, 0.0013 mg/l and 0.015 mg/l, respectively, as shown in Attachment 15 -- as well as an iron concentration of 5.1 mg/l. The average zinc concentration (0.041 mg/l ) was higher than in 2002 (0.001 mg/l). These results reflect contaminants in stormwater runoff from residential, highway, and commercial uses in the catchment area. Metals in the other ditch locations were within proposed standards.

The average BOD was a relatively low 7.99 mg/l. COD ranged from 41 mg/l to 270 mg/l. The 270 mg/l result was recorded from S4B, along with relatively low BOD; these results indicated a dissolved recalcitrant organic material. Excluding the result from S4B, COD averaged 51 mg/l. The COD/BOD ratio of approximately 6 indicates that, compared with the conditions in the lake and the Bisecting Canal, most of the dissolved organic matter is relatively easily biodegraded. Within the ditches, dissolved oxygen values averaged 1.50 mg/l, indicating a hypoxic condition. Turbidity levels averaged 12 NTU. Nitrate concentrations were all less than 0.1 mg/l, similar to the average of 2002-2003, and nitrite concentrations were all less than 0.1 mg/l. Sulfate concentrations averaged 82 mg/l, and chloride concentrations averaged 523 mg/l, reflecting freshwater conditions.

Alkalinity averaged 538 mg/l, the highest compared with the other areas, and pH averaged 7.49. Average ammonia levels increased from 0.18 mg/l in 2002-2003 to approximately 0.33 mg/l in 2010. Average phosphorus levels were relatively high at 0.3 mg/l, compared with the other sampled areas; the average concentration of phosphate was less than 0.005 mg/l in 2002. Carbon dioxide results were relatively high, averaging approximately 243 ug/l. Chlorophyll-a ranged from 3.2 ug/l to 91.8 ug/l, with the highest results at stations S4C and S4D, where a light green algae was observed (see pictures in Attachment 6). Stations S4B and S4C were the only onsite stations to exhibit sulfide with respective concentrations of 1.3 and 1.1 mg/l. Sulfide is indicative of anaerobic processes, typical in sediment layers, and associated with low oxygen conditions. Hydrogen sulfide is very toxic to fish. Tannins and lignins averaged 3.2 mg/l, also relatively high. Overall the conditions are eutrophic with decaying organics in a relatively low oxygen environment.

Bacteria results were higher in 2010 than in the dry period of April 2002. Fecal coliform averaged 1583 colonies/100 ml, and fecal streptococcus averaged 2275 colonies/100ml, exceeding the proposed standards limiting fecal coliform to 200 colonies/100 ml and fecal streptococcus to 35 colonies/100 ml. The highest onsite results for fecal streptococcus were observed at S4C and S4D.

In summary, the ditches represent a mixing of stormwater inputs and water from the Bisecting Canal. Water levels were exceptionally low with little or no flow. Water quality was eutrophic with low dissolved oxygen, visible algae growth, elevated phosphorus levels, and high bacteria levels. Elevated results for metals were observed at location S4B, where stormwater enters the property from the west, suggesting an offsite commercial source. The average zinc concentration in the ditches rose from 0.001 mg/l in 2002 to 0.041 mg/l in 2010.

Freshwater Ponds

The springs in the northwest corner of the property receive groundwater from upland areas in the southern part of the island. These areas are classified as Zone 5 with no restriction for physical development as it pertains to groundwater quality. Blackwater and graywater are routinely discharged into the upland limestone through residential suckwells on properties within the associated catchment area. Within the Sanctuary, water from the springs is pumped to the freshwater tray and the water treatment tank and discharges into the two adjacent freshwater lily ponds. The ponds also receive overland stormwater flow from adjacent residential neighborhoods and likely the agricultural fields north of the Sanctuary.

Average salinity at S1 in the west pond and S2A in the east pond decreased 50% from 1.2 ppt in 2002-2003 to 0.6 ppt in 2010. Average sodium concentration decreased 61% from 252 mg/l to 98 mg/l. The results suggest that the ponds have been influenced by brackish water in the past, likely from high lake levels, but in 2010 can be classified as freshwater. Temperature averaged 26.0° C. (A review of current and historical data is shown in Attachment 16. A review of field collected results and analytical data is shown in Attachment 15.)

Copper concentrations were relatively high, averaging 0.004 mg/l for the two ponds. The average zinc concentration of 0.029 mg/l was similar to the average observed from all onsite and offsite sample locations with the exception of the lake, which averaged 0.01 mg/l, but represented an increase over the ponds' 2002 concentration of <0.005 mg/l. The copper and zinc averages exceeded the Barbadian government's proposed marine ambient standards of 0.0013 mg/l and 0.015, respectively. Concentrations of dissolved lead and mercury were less than laboratory detection limits. Potassium and magnesium concentrations were relatively low, reflecting the freshwater condition of the ponds.

The average concentration of iron -- likely a natural component of the limestone -- was higher from the two ponds than from other sampled areas. This result, 1.35 mg/l, taken together with dissolved oxygen averaging a relatively low 1.79 mg/l, suggests that groundwater from the springs was oxygen-poor -- iron dissolves more readily in groundwater with dissolved oxygen levels of less than 1 mg/l. Large influxes of oxygen-poor groundwater have adverse implications for the health of the lake, into which these two ponds feed. The average biological oxygen demand was a relatively low 5.88 mg/l; the average chemical oxygen demand, 30 mg/l. The COD/BOD ratio of approximately 5 indicates that organic matter was more easily degraded in the freshwater ponds than in the lake or the Bisecting Canal.

The eastern pond exhibited a nitrate concentration of 0.33 mg/l, marginally above laboratory detection limits; the western pond exhibited a nitrate concentration of less than 0.1 mg/l. Nitrate concentrations in 2002-2003 were less than 0.02 mg/l. The nitrate result, although relatively low, reflects nutrients within the discharge from upland areas or is a result of natural organic decay. Relatively high phosphorus concentrations, averaging 0.16 mg/l, were exceeded only by those in the stormwater ditches, suggesting influence from offsite sources or mobilization of phosphorus from sediment as a result of hypoxic conditions.

The average ammonia level from the two ponds increased from 0.021 mg/l in 2002-2003 to 0.141 mg/l in 2010. The average alkalinity, 275 mg/l, twice the alkalinity of seawater near Barbados, suggests that groundwater discharging from the springs has a moderately high alkalinity attributable to the carbonate geology of the island.

Phosphorus levels averaged 0.16 mg/l, compared with phosphate levels in 2002 of less than 0.005 mg/l. Chlorophyll-a results ranged from 25.3 ug/l in the east pond to 137 ug/l in the west pond. The high reading reflected the most algae of all onsite and offsite sample locations, indicating potentially high nutrient load and eutrophic conditions. Tannins and lignins averaged a relatively low 0.8 mg/l, reflecting the groundwater source for the ponds. Fecal streptococcus averaged 565 colonies/100ml, approximately 325% higher than results from April 2002. Fecal coliform averaged 460 colonies/100 ml, down approximately 50% from 2002.

In summary, dissolved oxygen was low and iron concentrations were high, likely reflecting the discharge of oxygen-poor groundwater from upland areas. The occurrence of nitrate is attributable to the upland discharge or organic decay. Abundant algae growth is a reflection of relatively high levels of nutrients. Elevated phosphorus concentrations, possibly being mobilized from sediments in the hypoxic conditions, are another indicator of nutrient impacts. The average zinc concentration increased from <0.005 mg/l in 2002 to 0.029 mg/l, above the proposed Barbadian standard, possibly reflecting transport from upland areas.

Eastern Offsite Area

The area east of the Bisecting Canal is characterized by spikerush over approximately 75% of the area, with mangrove adjacent to southern extremities of the canal comprising the remaining 25%. At the time of sampling, northwestern parts of the area were dry. Although flow was negligible, water appeared to emanate from the northeastern corner of the swamp, where the sewage treatment plant was located, and move southward toward the coast and westward toward the Bisecting Canal. An access road to the sewage treatment plant marked the south edge of the area, and Government-owned agricultural fields on top of the First High Cliff lay adjacent to the northern property boundary.

Samples S9A, 13, and 14 were obtained from areas east of the Bisecting Canal. Sample 9A was obtained from the northern extent of saturation, approximately 100 feet east of the canal. Samples 13 and 14 were obtained within a cleared waterway that ran parallel to the access road along the southern edge of the wetland. Water appeared to emanate from the northeastern corner of the wetland, where the sewage treatment plant was located. In 2002-2003, water along the access road was not sampled, but two locations east of the Bisecting Canal were sampled, including water near a spring (location 9).

At the time of the sampling in 2010, the average water depth was 0.25 m (0.8 ft). Temperatures averaged 26.7° C. Average salinity was 0.7 ppt, down 66% from 2002. Average sodium concentration was 177 mg/l, down 74% from 2002. These results indicate more freshwater characteristics. (A review of current and historical data is shown in Attachment 16.)

Analyses for dissolved metals showed moderate concentrations of iron and zinc, low concentrations of potassium and magnesium, and no occurrences of lead, mercury, or copper above laboratory detection limits. The average zinc concentration increased from 0.004 mg/l in 2002 to 0.023 mg/l in 2010 and was marginally above the Barbadian Government's proposed marine standard, as shown in Attachment 15.

Alkalinity averaged a moderately high 290 mg/l with pH of 7.46. Average ammonia level increased marginally from 0.045 mg/l in 2002-2003 to approximately 0.14 mg/l in 2010. Dissolved oxygen concentration was 2.18 mg/l, down 58% from the average in April 2002. Average biological oxygen demand was 1.63 mg/l.

Nitrate concentrations averaged 2.04 mg/l, down approximately 50% from 2002, when a high reading of 10.6 mg/l near the spring raised the average, but highest among the sample areas in 2010. The location nearest the sewage treatment plant yielded the highest nitrate value from sample S13, 5.8 mg/l, and the only result for nitrite above laboratory detection limits during the sampling event, 0.016 mg/l. The proposed marine ambient standard for total nitrogen compounds is 0.1 mg/l. Phosphorus levels were all less than 0.1 mg/l. Carbon dioxide results averaged approximately 140 ug/l. Chlorophyll-a results averaged 36 ug/l. Tannins and lignins averaged a relatively low 0.9 mg/l.

Fecal streptococci results were approximately 100% higher than results from April 2002, averaging 790 colonies/100ml. Fecal coliform averaged 290 colonies/100 ml, down approximately 50%. Ambient marine surface water standards proposed by the Barbadian Government would limit fecal coliform to 200 colonies/100 ml and fecal streptococcus to 35 colonies/100 ml.

In summary, the freshwater marsh east of the Bisecting Canal exhibited the highest concentrations of nitrate, possibly from the sewage treatment plant, and bacteria counts exceeding proposed marine water quality standards. Average dissolved oxygen was 2.18 mg/l, just above the level classified as hypoxic, a low oxygen condition. The condition suggests that the area would have difficulty digesting a heavy organic load such as was reported to have occurred at the sewage treatment plant in 2005. An expected consequence of such an event would be lower dissolved oxygen conditions and further reduced water quality for the Graeme Hall ecosystem. The average zinc concentration increased from 0.004 mg/l in 2002 to 0.023 mg/l in 2010, above the Barbadian Government's proposed marine standard.

<u>Western Offsite Sample 4F</u>

Offsite sample 4F was obtained from a stormwater swale behind a restaurant/bar on Highway 7. The water, directed there by a stormwater gutter, contained debris from the restaurant and mosquito larvae. It was cloudy gray with no visible sheen and had a sewage smell. Water depth was 0.3 m (1.0 ft), temperature was 24.6° C, and salinity was 0.4 ppt. Other areas of the swale were dry. (A review of field collected results and analytical data is shown in Attachment 15.)

The sample from S4F exhibited concentrations of 0.0069 mg/l for lead, 0.018 mg/l for copper, and 0.056 mg/l for zinc. The results were relatively high, compared with other sample locations. The Barbadian Government's proposed marine standards would limit those concentrations to 0.0044 mg/l, 0.0013 mg/l, and 0.015 mg/l, respectively, as shown in Attachment 15. Concentrations of potassium, magnesium, sodium, sulfate and chloride were relatively low, reflecting the low salinity of the sample. Iron concentrations were 1.4 mg/l.

This site yielded the lowest dissolved oxygen result observed during 2010 sampling, 0.2 mg/l, and the highest BOD result, 88 mg/l, indicating a relatively high mass of biodegradable organic matter in the water. Alkalinity, at 160 mg/l, was lower than levels from other sample locations, suggesting a source other than surface water. Nitrate and nitrite concentrations were less than 0.1 mg/l; pH was 7.37. Results for sulfide, at 5.3 mg/l, and ammonia, at 1.1 mg/l, were the highest observed during the sample event.

The elevated ammonia and sulfide levels, together with low nitrate/nitrite, low dissolved oxygen, and the appearance of the water, indicate anaerobic decomposition of organics. The relatively high results for carbon dioxide, 310 ug/l, and chlorophyll-a, 98.9 ug/l, are other indicators of decomposing organic waste in a relatively oxygen-poor surface water. The phosphorus result of 1.3 mg/l was an order of magnitude higher than observed from any other sample location. Potential sources include detergent in the water or additional phosphorus mobility from sediments in anaerobic conditions. The chlorophyll and phosphorus results indicated hypereutrophic conditions.

Bacteria results showed fecal coliform too numerous to count -- no other sample station had higher levels -- with fecal streptococcus at 4500 colonies/100 ml and enterococcus at 1600 colonies/100 ml.

In summary, the appearance and smell of the sample suggest the swale behind the restaurant/bar contained wastewater, possibly old wash water, as opposed to stormwater. The water exhibited hypereutrophic qualities with high concentrations of lead, copper, and zinc, high bacteria counts, low oxygen, and byproducts of anaerobic decomposition, ammonia and sulfide, that are very toxic to fish.

### Freshwater Tray Sample 5A

Results were similar to the pond results with a few exceptions. The iron concentration, 8.5 mg/l, was the highest recorded during the sampling event -- approximately four times higher than that observed from the ponds. Copper (0.012 mg/l) and lead (0.0099 mg/l) concentrations also were relatively high. Dissolved oxygen of 15.55 mg/l indicated supersaturated oxygen conditions attributable to the mechanical pumping from the spring in the northwest corner of the property or to photosynthesis of algae in the very small amount of water that occupied the northwestern corner of the tray. However, the location exhibited average chlorophyll-a results of 22 ug/l.

### Surface Water Trends

Notwithstanding the difficulty of comparing one sampling event in 2010 to multiple sampling events in 2002-2003, EEC looked at average concentrations for locations within the Sanctuary that were identical over the two sampling periods. All 13 common locations exhibited a clear trend of reduced temperatures -- attributable to the February sampling time -- and downward concentrations of salinity, fecal coliform, fecal streptococcus, and biological oxygen demand. Reduced rainfall at the time of the 2010 sample event would account for lower levels of bacteria, which is carried with organic debris in runoff. Salinity has been discussed as a result of the inoperative sluice gate. Trends over the 7-year interval were mixed for pH, dissolved oxygen, nitrate, phosphorus, and total suspended solids.

### Pesticides in Surface Water

The Barbadian Government's proposed marine standards call for undetectable concentrations of pesticides, based upon best available technology. Several onsite and offsite locations showed concentrations indicating that agricultural runoff from upland areas has impacted the ecosystem. Samples 1 and 2A, obtained from the two spring-fed ponds in the northwest corner of the property, exhibited dieldrin at 0.0027 ug/l and 0.035 ug/l, respectively. The sample from the freshwater tray, which receives water pumped from the freshwater ponds, also exhibited dieldrin at 0.0034 ug/l. Samples 13 and 14, collected on the Government side of the ecosystem, showed respective dieldrin concentrations of 0.016 ug/l and 0.0028 ug/l. Offsite sample S4F behind the restaurant/bar exhibited 0.25 ug/l of the organophosphorous pesticide malathion, a typical residual from spraying for mosquitoes.

## Sediment Sampling for Chemical Analysis

Protocol: After surface water sampling, sediment samples were collected at 12 of the 20 locations by dropping a stainless steel Petite Ponar Grab vertically onto the sediment. Pulling up the sampler would close the clamshell device and collect a sample. Samples were emptied onto clean plastic trays, homogenized using a stainless steel spoon, and then spooned into the respective sample containers. Once filled, containers pre-labeled with sample name and analysis had date and time recorded and then were put in a cooler with ice cubes double-bagged in 1 gal plastic bags. Samples were shipped the same day using FedEx Priority overnight delivery.

Sample temperatures were all within the prescribed 4° C upon receipt at the laboratory. Laboratory analyses were performed for:

- Cadmium
- Chromium
- Copper
- Iron
- Lead
- Manganese
- Mercury
- Zinc
- Arsenic
- Aluminum
- Boron
- Barium
- Calcium
- Cobalt
- Magnesium
- Phosphorus
- Sodium
- Strontium
- Sulfur
- Titanium
- Vanadium
- pH
- Nitrate
- Nitrite
- Sulfate
- Sulfide
- Total Organic Carbon (TOC)
- Orthophosphate
- Ammonia
- Organochlorine Pesticides (EPA Method 8081)
- Chlorinated Herbicides (EPA Method 8151)
- Organophosphorous Pesticides (EPA Method 8141)

## Sediment Quality

### Lake and South Pond

Compared with 2002 results, average sodium concentration declined 88% from 9540 mg/kg to 1170 mg/kg, and magnesium dropped 92% from 16,600 mg/kg to 1,300 mg/kg. Concentrations of zinc, which was found in fish tissue, averaged 7.3 mg/kg. Metals concentrations in general dropped approximately 75% and were lower than in other sampled areas. The change to freshwater from a lack of seawater is the most plausible explanation for the reduction of metals in sediment.

The northeast corner of the lake yielded the highest result for orthophosphate onsite or offsite, 3.9 mg/l. The location is closest to the Government of Barbados' agricultural site, suggesting influence from agricultural runoff. Orthophosphate is a soluble form of phosphorus that occurs naturally but is commonly found in fertilizers and other manmade products. Within the lake, ammonia levels were also highest in the northeast corner at S10, possibly associated with the cattle egret nesting area in the adjacent mangrove area. Ammonia is a natural byproduct of decomposition in anaerobic sediments. Fecal bacteria results in this area of the lake were also high.

### Bisecting Canal

Average sodium concentration in canal sediments declined 82% from 4160 mg/kg to 750 mg/kg, reflecting movement toward freshwater conditions in overlying surface water. The sample from the south end of the canal exhibited relatively high results for arsenic at 0.72 mg/kg and for mercury at 0.024 mg/kg, results, coinciding with elevated metals concentrations in the stormwater ditches. Metals concentrations otherwise dropped 50% or more in the canal, compared with 2002 results.

### Onsite Stormwater Ditches

With the exception of offsite sample 4F, the stormwater ditches exhibited the highest average result for arsenic, a relatively toxic substance, at 0.87 mg/kg and the highest concentration of zinc, 51 mg/kg. The average result for mercury, 0.023 mg/kg, also was relatively high. In general, the ditches exhibited the second-highest concentration of metals, after the freshwater ponds. Compared with 2002, results for magnesium, manganese, lead, strontium, titanium, and vanadium decreased by approximately half. Samples in 2010 were taken from 4B and 4E because 4A, the location farther north where the 2002 sediment sample was obtained, was dry.

### Freshwater Ponds

The increased result for mercury, 0.023 mg/kg, was higher than at other sample locations and suggested a source related to human activity. The ponds also exhibited the highest concentrations for barium, cadmium, cobalt, iron, manganese, strontium (with the exception of the offsite sample 13), titanium, and vanadium. Relatively high concentrations of metals may be associated with the presence of iron, which is more mobile in anaerobic groundwater. Average zinc concentration of 8.2 mg/kg was similar to that of the lake. Metals concentrations in general (excluding mercury and titanium) dropped 50-75% in comparison with 2002 results. Average sodium concentration declined 77% from 2,605 mg/kg to 595 mg/kg, reflecting increasing freshwater conditions in overlying surface water.

Station 1A in the west pond exhibited the highest result for ammonia, onsite or offsite, at 65 mg/kg. The result reflects degradation of nitrogen compounds within anaerobic sediments and the low-to-moderate dissolved oxygen content in surface water. The presence of the relatively soluble compound orthophosphate -- the second-highest such result at 3.5 mg/l -- suggests potential impacts from fertilizer or other manmade compounds.

Eastern Offsite Area

The sample from the south end of the canal exhibited the highest result for strontium, 3100 mg/kg, and relatively high results for titanium, 43 mg/kg. as well as averages of 6.4 mg/kg for vanadium, 0.023 mg/kg for mercury, and 2,500 mg/kg for iron. As in the freshwater ponds, metals may be binding with iron. The average zinc concentration of 21 mg/kg was second-highest among the sample areas. No comparisons were made to 2002 results, as samples were obtained in widely different locations.

Western Offsite Sample 4F

The sample from a commercial site north of Highway 7 exhibited the highest concentrations of arsenic, chromium, copper, and zinc and a relatively high concentration (3.1 mg/kg) of orthophosphate, suggesting the presence of fertilizer waste or other manmade products. In general, metals concentrations in sediments were reduced from the 2001 and 2002 samplings. The loss of seawater, which has trace levels of all metals and minerals, could explain this reduction. Increases in some select metals could be due to stormwater runoff impacts. The sample also exhibited the highest concentration of sulfide, indicating strong anaerobic degradation. Hydrogen sulfide is very toxic to fish.

### Pesticides in Sediment

The pattern of surface water and sediment results suggests that pesticides have entered the Sanctuary from offsite areas. (Attachment 15 lists the sediment chemical analysis results by location. Attachment 17 discusses historical pesticide use.) Sediment at sample station 4B exhibited 0.19 ug/kg dieldrin. Further downstream within the stormwater ditch at 4E, dieldrin was exhibited at 0.42 ug/kg and 4.4 DDE at 0.51 ug/kg. Concentrations of dieldrin at 0.29 ug/kg and chlordane at 14 ug/kg were found in the south pond at location 6B. Offsite concentrations of dieldrin were present west of the Sanctuary at 4F (1.4 ug/kg) and east of the Sanctuary in the freshwater marsh at sample location S13 (1.0 ug/kg). Chlordane was present at 4F in a concentration of 85 ug/kg, as was heptachlor epoxide at 0.17 ug/kg.

## Sampling for Benthic Analysis

The benthic community is a useful indicator of the health of a key element of an ecosystem. At 10 locations within the Sanctuary and the Bisecting Canal, sampling for benthic analysis was performed similar to the sediment sampling for chemical analysis, using a Petite Ponar sampler. Samples were emptied into clean plastic trays. A portion was put into a sample container, and the rest was sieved with a 45 micron sieve. The sieve material was used to half-fill as many sample containers as necessary, and the containers were filled with formalin (3.7% formaldehyde). Once filled, containers were labeled with sample name, date, and time and then put in a cooler for shipping purposes. Because of the preservative, no icing was required. Angelo Tulimieri hand-carried the samples, which were shipped by American Airlines passenger baggage service.

## Benthic Community

Dr. Bruce Barber of Terra Environmental Services, Inc. in St. Petersburg, Florida, prepared the benthic sample analysis in conjunction with Dr. Gregg Brooks of Eckerd College Sediment Laboratory. They analyzed the samples for species richness, abundance, Shannon Diversity

Index, sediment grain size, carbonate percentage, and organic percentage. The complete report is in Attachment 18.

From the 10 samples taken throughout the Graeme Hall ecosystem, 777 benthic macroinvertebrates representing 17 taxa were identified. All were exclusively freshwater. (See Attachment 4B for locations of benthic samples.) Of the 17 taxa identified, 8 were Annelids, 4 were Molluscs and 5 were Arthropods. The greatest biodiversity was in Sample B4 in the north end of the “brackish" tray. The lowest biodiversity was in Sample B9 in the southeast corner of the lake at the interconnect with the Bisecting Canal. Samples B6 and B10, in close proximity on the lake, were the most similar in taxonomy. Samples B1 and B3 were similar, as calculated on the Bray-Curtis Similarity Index. B3 is in the stormwater ditch nearest the entry to the Sanctuary, and B1 is at the discharge point of the emergency raw sewage line from the sewage treatment plant. Apparently, similar benthic communities adapt to these conditions. The small grain size of the samples overall is indicative of poor circulation and sediment from land drainage.

According to the report, “There is evidence of sudden disturbance to the freshwater community of the Graeme Hall Nature Preserve. Eight of the ten samples examined for this project contained numerous dead gastropod shells (mostly *Melanoides tuberculatus* and *Hydrobiidae* spp.) that appeared to be in otherwise good condition. This might be the result of low dissolved oxygen levels occurring at night and exacerbated by the high organic content of sediments and high water temperature.”

The fish and crab kills that have been reported could be attributable to one or more such disturbances. The raw sewage discharge of 2005, which entered the ecosystem from the east, could explain this finding. It is worthy of note that the two sample sites without dead gastropod shells, B3 and B4, were the westernmost, farthest from the sewage treatment plan. The one with the highest biodiversity, B4, was farthest from stormwater impacts from all ditches and culverts draining to the lake. The lack of dead gastropods in the stormwater ditch at B3 tends to relieve stormwater as the sole cause of the "sudden disturbance."

All locations indicate an ecosystem low in biodiversity. A red mangrove community in Florida had benthos of more than 300 taxa and densities of 22,591 to 52,914 individuals. The Graeme Hall results, by contrast, reported 17 taxa and densities from 304 to 10,609 individuals. If the connection to the seawater were restored, it is likely the biodiversity of the lake and canal would increase.

## Tilapia and Crab Sampling

The Sanctuary's biological reports record a historical tendency toward fish kills following periods of heavy rains and high temperatures, including one affecting 3,000 fish in September 2001. Fish kills also were reported anecdotally in association with a massive untreated wastewater release into the Graeme Hall wetland in July 2005. Other reports of fish kills from 2005 to 2009 are documented in Attachment 19. The crab kills started in 2009.

Tilapia and blue land crabs were sampled from the lake and shoreline -- some iced and shipped whole, others dissected and placed in a 10% formalin solution and shipped by Federal Express overnight delivery. The fish samples were taken near location S6B; the crab samples, between S4C and S4D.

Denise Petty, DVM, at the University of Florida's College of Veterinary Medicine and Fisheries and Aquatic Sciences in Gainesville, Florida, performed an array of tests as follows:

- necropsy with parasitic exam and bacterial culture
- bacterial identification
- histology
- virology
- copper
- lead
- zinc
- mercury

- organochlorine analysis

## Tilapia and Crab Analysis Results

Seven dead tilapia were shipped to the University of Florida for analysis, all appearing to be in good body condition. No parasites were observed on any external tissue. A few small granulomas were observed in the liver, spleen, and kidneys of all fish; all other organs appeared to be within normal limits. Bacterial cultures were negative for growth. No viral particles were observed by electron microscopy. Low numbers of metacercariae (encysted nematode larvae) were found in the liver, spleen, and kidneys of all fish.

Tissues were analyzed for lead, mercury, zinc, copper, and toxic organic compounds. The concentration of 91.8 ppm of zinc in the gills of the tilapia was higher than anticipated. Dr. Petty referred to a paper by Hilmy reporting that elevated water temperatures can make tilapia more susceptible to zinc toxicity.

The full report is in Attachment 20. Dr. Petty suggested that the fish be sampled again during the hotter summer months to determine whether higher water temperatures were affecting the fish due to zinc toxicity. Addressing the finding of trematode larvae in some organs of the tilapia, the report included a copy of a paper by Keiser and Utzinger on human health concerns associated with eating improperly cooked tilapia.

The two blue land crabs were observed to have no significant pathogens, lesions, or remarkable features. Bacterial cultures revealed an environmental organism (Halomonas sp.) on one crab; the other crab showed no growth.

The Sanctuary's monthly biologist reports from 2000-2001 provide data to support a correlation between rainfall and fish kills. In Attachment 19, a table records heavy rainfall followed by a time lag and then a fish kill after temperatures increased. Two graphs in Attachment 21 show rainfall vs. time and temperature vs. time. The data indicate that the recorded fish kills were all between July and October, when rainfall and temperature are highest. These data show the fish kills correlate with rainfall and temperature.

This pattern is consistent with a phenomenon much reported in scientific literature: a low dissolved oxygen (DO) fish kill. Inadequate DO in aquatic environments is a well-established cause of fish morbidity and mortality (Choi, 2007). It is attributed to stormwater runoff carrying large amounts of sediments, organic debris, nutrients, and other chemicals that increase the oxygen demand of the water column. This, coupled with an increase in temperature, reduces the water's ability to hold oxygen; DO and temperature have an inverse relationship. Oxygen depletion in the water kills fish.

This is the most likely explanation of fish kills in the Graeme Hall Mangrove Ecosystem. Other possible explanations include algal blooms, zinc toxicity with elevated water temperatures, ammonia toxicity, or a combination of chemical or biological influences. A major fish kill in a fish farming area in the Philippines in 2002 was the consequence of a DO sag followed by a bloom of dinoflagellate Prorocentrum (San Diego-McGlone, 2008). It has also been demonstrated that Nile tilapia exposed to acute hypoxia (low DO) have a weakened immune system and become more susceptible to disease (Choi, 2007).

## Sources of Surface Water Impacts

A total catchment area of approximately 1156 acres (468.2 ha) flows into the Graeme Hall Mangrove Ecosystem. Starting from an elevation of 100-110 m at Upton and Kent, water flows toward the shoreline through swales, ditches, and culverts to larger and larger drainage conveyance systems. Storm events carry runoff from residential, commercial, and agricultural activities, as well as schools and highways. Each type of land use produces different pollutant loads.

Two large ditches enter the Sanctuary from the west, conveying a significant stormwater load. Stormwater ditches at the north end of the Graeme Hall Bisecting Canal convey runoff from the agricultural lands and beyond.  The eastern flow to the Sanctuary comes through the spikerush marsh, fed into the Bisecting Canal by ditches and culverts.  The main lake is the ultimate reservoir of the flow.  (See Attachment 4C for aerial photographs of The Graeme Hall Catchment Area.)

Historical records and studies of surface runoff for the island of Barbados are “very limited, with little reliable data available” (Arriola, 2008).  Because Barbados is similar in its geological and hydrogeological characteristics to Florida, EEC researched published literature from Florida stormwater runoff studies.  The Florida Department of Environmental Protection has accumulated data on typical pollutants and nutrients and runoff rates expected from various types of land use -- namely, agriculture row crops and pasture, residential, low-intensity commercial, and forested lands.  These stormwater pollutant concentrations can be utilized to estimate the impact of stormwater events on biochemical oxygen demand, total suspended solids, nutrients, and heavy metals carried off the generating site and discharged to Graeme Hall Sanctuary.

The continual dosing of urban and agricultural runoff into a system that cannot itself discharge regularly to the sea ultimately leads to a concentrating effect of pollutants in the water column and sediments of the lake, pond, and canal system.  Attachment 22 provides an estimate of the accumulated pollutants on an annual basis.  Based on the average annual rainfall of 1266 mm (49.9 in), the catchment area is estimated to produce annual runoff containing 4468 lb of total nitrogen, 727 lb of total phosphorus, 15,830 lb of biochemical oxygen demand (BOD), 100,344 lb of total suspended solids, 34 lb of copper, 9 lb of lead and 137 lb of zinc.

Historically, seawater did enter the ecosystem by way of the sluice gate that controls the hydraulic connection between the mangrove ecosystem and the coastal near shore. Since the early 2000s, the gate has been opened only infrequently, and in 2006 it fell into permanent disrepair, stuck in the closed position.  Since 2004, appeals to the Government to get the gate repaired and operational have failed despite the Sanctuary's written offers of technical and financial assistance.

It should be noted that the Government-owned spikerush marsh receives runoff from surrounding urban lands, residences, and commercial properties north and east of the marsh. Near the northern end of the Bisecting Canal are other drainage paths from agricultural lands owned by the Barbadian Government.

North and west of the Graeme Hall Sanctuary, residential subdivisions discharge street and surface runoff into the ecosystem. West of the lake, two large drainage ditches and a smaller stormwater swale drain urban lands, road systems, commercial properties, and undeveloped land to the west. On the south side, commercial entities along the highway back up to the Graeme Hall Nature Sanctuary and discharge stormwater. In one case, poor water quality in a stormwater ditch behind a restaurant indicated a wastewater discharge along the southern perimeter of the Sanctuary. Each of these sources in its own way discharges pollutants that accumulate in the Graeme Hall Nature Sanctuary.

From west, south, north and east, stormwater runoff conveyances bring significant loads of organic debris, nutrients, bacteria, chemicals, and suspended solids into the Sanctuary. The present operational scenario does not allow these to be discharged out to sea in any manner.

At 8 of 20 sample points in the Graeme Hall lake and pond system, fecal bacteria concentrations exceeded the proposed water quality standards for Barbados' marine protection (Appendix F: Marine Pollution Act, Proposed Discharge Standards, 2004), which would limit fecal coliform to 200 col/100 ml. These results dictate that no swimming or human contact with the water is advisable. A study conducted along the West Coast of Barbados in the mid-1990s showed that 80% of the beaches sampled should have been posted “closed for swimming” for exceeding national bacteriological beach bathing water quality standards (Arriola, 2008).

For primary contact recreation, the United Nations Environment Program (UNEP) recommends fecal coliform counts of less than 100 col/100 ml for 50% of the samples collected. The World Health Organization (WHO) guidelines are less stringent, recommending that 90% of the samples show less than 1000 col/100 ml. The Blue Flag Organization, an international nongovernmental organization, uses a fecal bacteria count of 100 col/100 ml as an international bathing standard. Barbados unsuccessfully sought Blue Flag certification for Worthing Beach in the early 2000s.

In other testing by EEC in February 2010, sample results were abnormally high compared with the proposed Barbadian water quality standards for fecal streptococci, enterococci, nitrate, total phosphorus, total suspended solids, chlorophyll-a, and turbidity. The results were abnormally low compared with the water quality standards for salinity and dissolved oxygen. The following table, also contained in Attachment 23, compares the on-site results and the Barbados standard.

## Graeme Hall Water Quality vs. Marine Water Quality Standards

| Parameter (unit) | 2010 Graeme Hall Result (avg) | Barbados Proposed Marine Standard | Parameter Notes | Human Health Consideration |
|---|---|---|---|---|
| Enterococci (cols/100 ml) | 842 | 35 | Indication of waste from animals | Disease |
| Nitrate (mg/l) | 0.15 | 0.0098 | $NO_3$ oxide of nitrogen nutrient/fertilizer | Drinking water less than 10 ppm |
| Total phosphorus (mg/l) | 0.4 | 0.015 | Nutrient/fertilizer | Drinking water |
| Total suspended solids (mg/l) | 39 | 5 | Amount of material suspended in water column: sewage 200+/- | Drinking water less than 5 ppm |
| Chlorophyll-a (ug/l) | 33 | 0.0005 | Indicator of eutrophication | N/A |
| Turbidity (NTU) | 12.3 | 1.5 | Clarity of water | N/A |
| Zinc (ug/l) | 0.029 | 0.015 | Trace metal bioaccumulation | Drinking water standard |
| Salinity (ppt) | 1.4 | n/a | Brackish 6-15 ppt<br>Seawater 30-35 ppt | N/A |
| Dissolved oxygen (mg/l) | 4.6 | 90% sat. (7.01 mg/l at 27.7°C, 3000 uS) | Greater than 5 mg/l for fish recommended | N/A |

## **South Coast Sewage Treatment Plant and the Emergency Discharge Structure**

The South Coast Sewage Treatment Plant, located east of the Graeme Hall ecosystem, was constructed to provide preliminary treatment of wastewater prior to repumping to an ocean outfall. This is simply a screening system -- the least intensive among three levels of sewage treatment: primary, which utilizes sedimentation; secondary, which reduces biochemical oxygen demand and total suspended solids; and tertiary, which removes nutrients. The treatment plant was designed within an emergency bypass line directed into the Graeme Hall Bisecting Canal. Two 8-inch lines constructed in 2003 release raw sewage into the canal when the treatment plant has an emergency situation. (See the location of the discharge pipes on the Site Plan Attachment 4A.)

The Barbados Storm Water Drainage Study (excerpts, Attachment 7) reported how an emergency sewage discharge would occur with the sluice gate controlling the overflow. "If an emergency overflow were to occur the discharge to the sea could be controlled and monitored in order to minimize environmental impacts. . . . Some cleanup of the channel banks may be required to remove plastics, rags and other objectionable floating debris." The design of the emergency discharge structure depended on the sluice gate to be fully operational to allow the discharge of raw sewage out to sea. With the sluice gate closed, the pipes allow raw sewage to flow freely into the main lake of the Sanctuary.

It was reported in 2005 that a raw sewage spill from the treatment plant discharged anywhere from 3 million to 6 million gallons of raw sewage via overland flow that made its way across the Government-owned spikerush marsh and ultimately into the lake. That discharge brought organic waste, nutrients, and pathogens, as well as chemicals, cleaners, oil and grease, and all the other components of urban sewage. Benthic sampling in February 2010 indicated that some "sudden disturbance" had killed the gastropods in 8 of 10 locations, a finding consistent with the impact of just such an event.

Other discharges, either by overland flow or by emergency discharge pipe, have not been logged for public review, such that the total quantity of raw sewage discharged into Graeme Hall Sanctuary cannot be quantified at this time. The discharge of untreated raw sewage has human health implications -- diseases such as hepatitis, typhoid, cholera, and salmonella, to name a few. Any pathogens discharged into the ecosystem without being recovered or disinfected in some manner present a disease threat to persons who come in contact with the water.

Public health protocols typically require that disinfectants be used to minimize the impact of pathogens from a raw sewage spill. A typical response to such an emergency would require containment and retrieval of the waste to put it back into the treatment system. None of these measures appears to have been implemented during the raw sewage spill that flowed to the Graeme Hall Nature Sanctuary in 2005. Rather, the Government seems to have used the wetland itself as the containment area.

The Barbados Storm Water Drainage Study confirmed this de facto Government policy to allow dumping of sewage into the wetland ecosystem. Upon inquiry, the Barbadian Environmental Protection Department advised that there was no formal protocol for dealing with sewage spills and that each occurrence would be dealt with on an individual basis. As designed and built, the emergency sewage discharge lines have no automatic controls to open the downstream sluice gate when the emergency raw sewage discharge is activated. In fact, the discharge structure appears to have been abandoned.

The discharge of raw sewage into the spikerush wetland, as happened in 2005 with no remediation, can only exacerbate the accumulation of pollutants in the Graeme Hall lake system. Any future emergency discharge of raw sewage in the canal -- an inevitability, given the potential for mechanical failure at the sewage treatment plant -- will further degrade the water quality and sediment at the Sanctuary.

## Future Considerations: Managing the Sanctuary's Health

Municipal point sources and urban runoff are the two leading sources of water quality impairments to estuaries, according to the most recent U.S. National Water Quality Inventory reports (EPA, 2000). Of 15,676 square miles of estuaries that this inventory determined to be impaired, 5,045 square miles (32%) were polluted by urban runoff, and 2,811 square miles (18%) were impaired by agricultural runoff (EPA, 2000). Urban development is one of the major contributors to mangrove destruction (Alongi, 2002).

Consequently, Graeme Hall Nature Sanctuary faces a potentially greater problem from stormwater runoff than from agricultural runoff. EEC estimated nutrient loadings on the Sanctuary based on existing and proposed land uses within the entire stormwater catchment area. Increased nitrogen, phosphorus, metals, biological oxygen demand, and total suspended solids are the expected result as Government land use changes and the 2003 National Physical Development Plan diminish environmental buffers. (See Attachment 22A for the future estimated increases.)

Agricultural lands owned by the Government of Barbados have been redesignated to allow residential and commercial development, with resulting stormwater runoff and contaminants, right up to the edge of the Ramsar site and the Sanctuary. Approximately 160 upgradient agricultural acres adjoin the Ramsar site. Compounding the issue, the Sanctuary's main lake is on the receiving end of the 1156-acre catchment area. Further groundwater impacts can be expected if blackwater and greywater suckwells are constructed upgradient of the Sanctuary.

Additionally, the benefits of a recharge area and vegetation buffer stand to be lost as residential and commercial uses proliferate right up to the ecosystem boundary.

Given the stresses from manmade impacts that have impeded its original purpose of promoting preservation, tourism, and education, the Sanctuary found it necessary to close its doors to the public in March 2009. Recognizing that the health of the Mangrove Ecosystem is paramount to the preservation of the resource as a vital habitat for waterfowl and for future generations of Barbadians, the Sanctuary acknowledges its position:

- The Sanctuary cannot control the agricultural runoff that flows to it from lands owned by the Government of Barbados. There is insufficient land in the Sanctuary to attempt to pretreat the runoff before it enters the Sanctuary.

- The Sanctuary cannot regulate or enforce clean stormwater runoff standards or prosecute wastewater violations by commercial entities that border it on the south.

- The Sanctuary cannot control the influx of stormwater runoff and groundwater discharges driven by force of gravity from the suburban residential development to the north. Water quality issues from blackwater and greywater systems contribute contaminants to the shallow aquifer, affecting the onsite springs.

- The Sanctuary cannot restrict or treat the inflow from the large ditches on the western boundary, which bring contaminants of all sorts from the highway, pastureland, institutional, and residential runoff in the catchment area.

- The Sanctuary cannot restrict the flow of raw sewage from the emergency overflow lines designed by the Government-owned Water Authority to use the Mangrove Ecosystem as a dumping ground when the inevitable mechanical failure of the South Coast Sewage Treatment Plant occurs. The Sanctuary cannot protect itself from the human pathogens present in this sewage.

- The Sanctuary cannot control the regular and consistent operation of the Government-owned sluice gate to help restore natural salinity to the Mangrove Ecosystem. The long-term deprivation of this salinity is having devastating consequences for the future health of this ecosystem.

- The Sanctuary cannot restore the natural flushing that historically cleansed the lake, ponds, wetlands, and canal. The Government's failure to maintain the sluice gate is imposing a burden on the Sanctuary not imposed on any other catchment area on the island, namely, the prohibition of discharge from natural rainfall events. This runoff discharge during critical storm events is vital to maintaining water quality within the Sanctuary.

Any of these by itself is enough to warrant concern. Taken in aggregate, they constitute a harmful Government policy that will continue to degrade the natural Mangrove Ecosystem. This is the same mangrove system that Barbados recognizes as a National Heritage Site, worthy to be placed on an International Registry of Important Wetlands -- a resource of paramount importance not only to the waterfowl its habitat sustains, but to generations of Barbadians.

## Conclusions

- **Urban and agricultural runoff are concentrating pollutants in the water column and sediments of the Sanctuary's lake, pond, and canal system.** The catchment area of 1,156 acres (468.2 ha) delivers tons of organic matter, nutrients, oils and greases, trace metals, and chemicals in annual stormwater runoff. Septic waste from suckwells permeates upland limestone and coral rock. A swale behind a business on Highway 7 contained wastewater exhibiting high levels of ammonia and sulfide, which are very toxic to fish, and fecal coliform bacteria too numerous to count. All of these pollutants drain toward the Sanctuary without the discharge to the sea that is typical of other catchment areas. Some can be processed and assimilated in the natural cycles of a healthy mangrove forest; others, such as heavy metals and pesticides, accumulate in the system.
- **Average salinity in the Sanctuary's mangrove lake has declined from 8.4 ppt in 2002 to 1.9 ppt in 2010, a 77% reduction that correlates with a 75% sodium reduction.** Brackish water is a defining characteristic of the estuaries where most mangrove ecosystems are found worldwide; their salinity is typically an order of magnitude higher than the lake water results at Graeme Hall. Salinity in the Bisecting Canal, reported at 29-34 ppt in 1986, was 1.33 ppt in 2010.

- **Almost every biotic and abiotic indicator points to a freshwater transformation of the mangrove wetlands.** In the absence of brackish water, nearly all of the flora and fauna that typically live in the intertidal zone on red mangrove roots were missing. Benthic analysis indicated the invertebrate community consisted exclusively of freshwater rather than saltwater species. Analysis also revealed that some disturbance -- likely a sudden change in water chemistry -- had caused the death of otherwise healthy gastropods in all but two sample sites: those farthest from the sewage treatment plant.
- **Lake tributaries were oxygen-poor and high in nutrients, a combination associated with algae overgrowth, low water quality, and fish kills.** Poor circulation in the absence of tidal flushing contributes to low dissolved oxygen in the ponds, ditches, canal and marsh. Heavy nutrient loads from stormwater runoff stress the ecosystem's ability to metabolize nutrients and support aquatic life. High chlorophyll-a and phosphorus readings correspond to ratings of eutrophic to hypereutrophic on the Trophic State Classification Index, indicative of high-nutrient water bodies with algae growth. The relationship between high quantities of stormwater runoff and water degradation is likely a factor in recurring fish kills.
- **Water quality analyzed from the Sanctuary and its surroundings in numerous instances, violate proposed Barbadian standards for the protection of the environment and public health.** Some surface water samples fell below desired levels for salinity and dissolved oxygen and exceeded the limits for fecal coliform, fecal streptococci, fecal enterococci, nitrate, total phosphorus, total suspended solids, chlorophyll-a, and turbidity. Poor water quality reflects the lack of a regular influx of seawater and the inability to discharge excess runoff to the sea.
- **Fish analysis revealed trematode larvae and elevated levels of zinc in tilapia.** Zinc, which some water samples exhibited in amounts exceeding the proposed standard, can be toxic to fish, especially in oxygen-poor water during periods of high temperature. Trematode larvae identified in fish organs can lead to human health concerns from eating improperly cooked fish.
- **Pesticides were detected in the water column and sediments at the Sanctuary and found in high concentrations offsite.** Samples from the freshwater marsh and the

spring-fed freshwater ponds exhibited dieldrin, chlordane 4,4 DDE, and heptachlor epoxide, pesticides that persist in the environment and tend to bioaccumulate. Together with the orthophosphate found in sediments, they indicate an impact on the Sanctuary from agricultural runoff.

- **The dysfunctional Government-owned sluice gate increases the flooding potential for the Sanctuary and adjacent lands; it also precludes a remedy for low surface water levels during drought.** The Barbados Drainage Study in 1996 indicated that a 100-year rainfall event of 24 hours would flood the wetland to at least 1.6 m. Cumming Cockburn, et al., advised in that report that a perimeter berm be installed around the ecosystem to this elevation to prevent flooding of adjacent residences and businesses. No such precaution has been undertaken.
- **The existence of a high-volume emergency raw sewage discharge line into the Ramsar wetland and the Sanctuary presents an ongoing threat to water quality, the wetland ecosystem, and human health.** The disrepair of the sluice gate makes it likely that any emergency bypass of the South Coast Sewage Treatment Plant will bring raw sewage and low-oxygen water to the Sanctuary, further degrading water quality and stressing aquatic life.
- **Land use changes north and east of the Graeme Hall ecosystem will bring more pollutants and reduce greenbelt buffering.** Zoning of 160 acres of Government-owned agricultural lands will allow residential and commercial development right up to the ecosystem boundary. This will funnel more pollutants into an ecosystem already deprived of an outlet to the sea.
- **The low biodiversity of the Sanctuary's benthic community, as indicated by taxa and individuals observed, represents a critically endangered mangrove ecosystem.** Seventeen taxa were identified in densities from 304 to 10,609 per square meter; by comparison, a healthy red mangrove community in Florida had 300 taxa and densities from 22,591 to 52,914 per square meter. Benthic biodiversity was highest in sites farthest from stormwater runoff inputs and would likely increase if connectivity to the ocean were reestablished. The Sanctuary staff has also noted the decline of fiddler crab and blue land crab populations, yet another indicator of an ailing ecosystem.

- **A red mangrove forest that has existed for no less than 1,300 years is at substantial risk of being lost unless its connection to seawater and tides is restored.** Salt-tolerant mangroves lose their competitive edge in a freshwater environment**.** Any openings in their canopy that would allow sunlight to reach the forest floor -- especially the sudden impact of a fire, hurricane, lightning, or disease -- could permit their displacement by an invasion of freshwater plants. Many freshwater species already are present, indicating an increased risk for failure of the Graeme Hall Mangrove Ecosystem.

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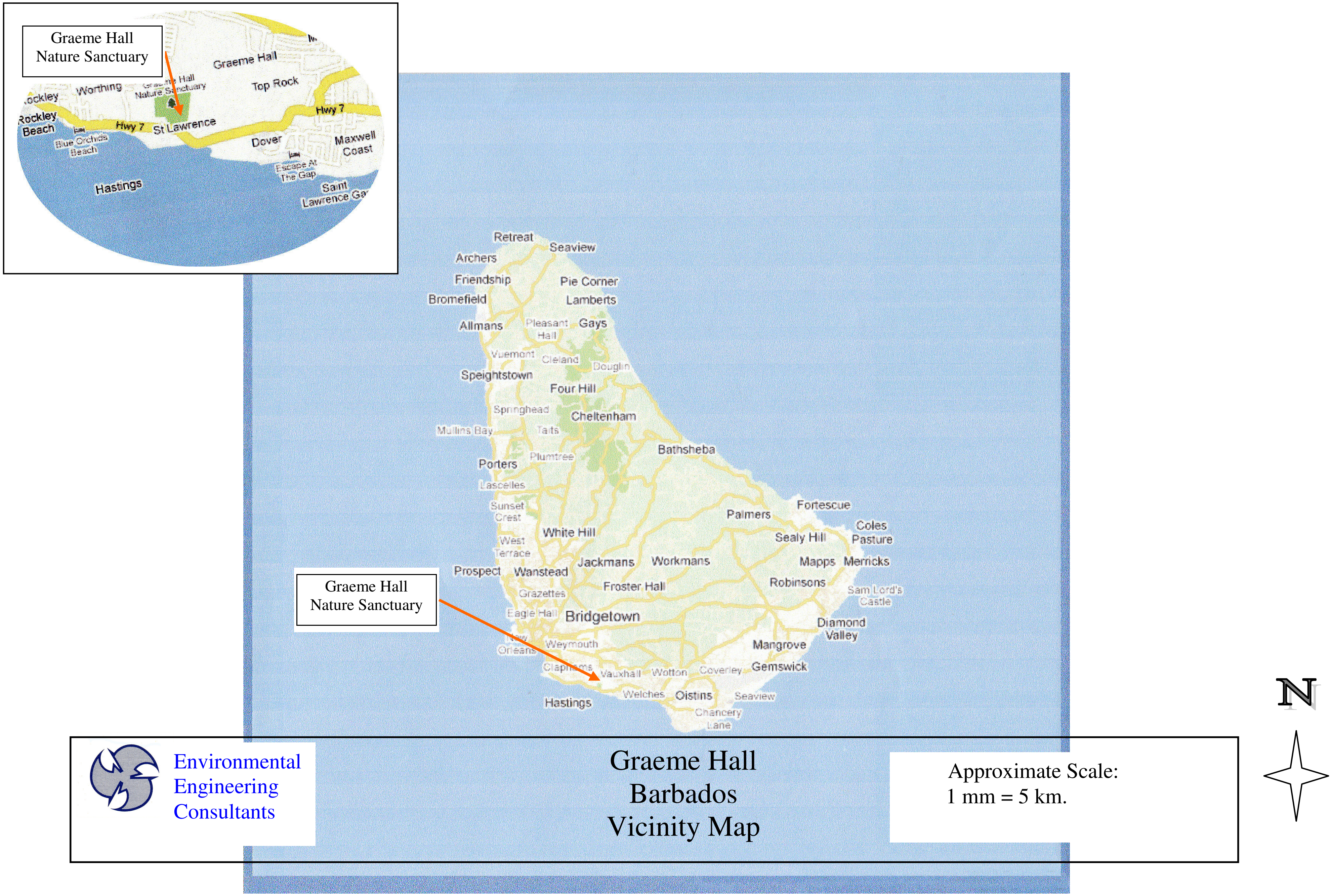
ATTACHMENT 1

Vicinity Map



Environmental
Engineering
Consultants

# Graeme Hall
# Barbados
# Vicinity Map

Approximate Scale:
1 mm = 5 km.

# ATTACHMENT 2

## RAMSAR Wetland Boundary Map

Environmental
Engineering
Consultants

# Graeme Hall RAMSAR Boundary Map

Approximate Scale:
1 mm = 5 km.

# ATTACHMENT 3

# RAMSAR Designation

# The Annotated Ramsar List of Wetlands of International Importance

# BARBADOS / BARBADE

**The Convention on Wetlands came into force for Barbados on 12 April 2006. Barbados presently has 1 site designated as a Wetland of International Importance, with a surface area of 33 hectares.**

**site; date of designation; region, province, state; surface area; coordinates**
**site; date de désignation; région, province, état; superficie; coordonnées**
**sitios; fecha de designación; región, provincia, estado; área; coordenadas**

**Graeme Hall Swamp.** *12/12/05*; 33 ha; 13°04'N 059°35'W. A naturally created coastal wetland area with mangrove forests, a seagrass bed, and a shallow nearshore coral reef, which includes a 12-acre artificially-created lake that constitutes the largest body of inland water on the island. At least 84 bird species have been recorded, including Caribbean coot (*Fulica caribaea*) and Yellow warbler (*Dendroica petechia*), and the site's Red mangrove (*Rhizophora mangle*) and white mangrove (*Laguncularia racemosa*) stands are the largest healthy mangrove areas left on the island. There are more than 20 fresh and brackish water fish species, among the most interesting of which are those marine species that have become isolated from the sea and become breeding residents of the lake. Fishing has been suspended pending study of the effect of the water quality for human consumption of fish and the effects on fish populations of the introduction of aggressive tilapia species. Ecotourism and environmental educational and research activities are the chief human uses of the site, which has been proposed as a National Heritage Site. Ramsar site no. 1591. Most recent RIS information: 2005.

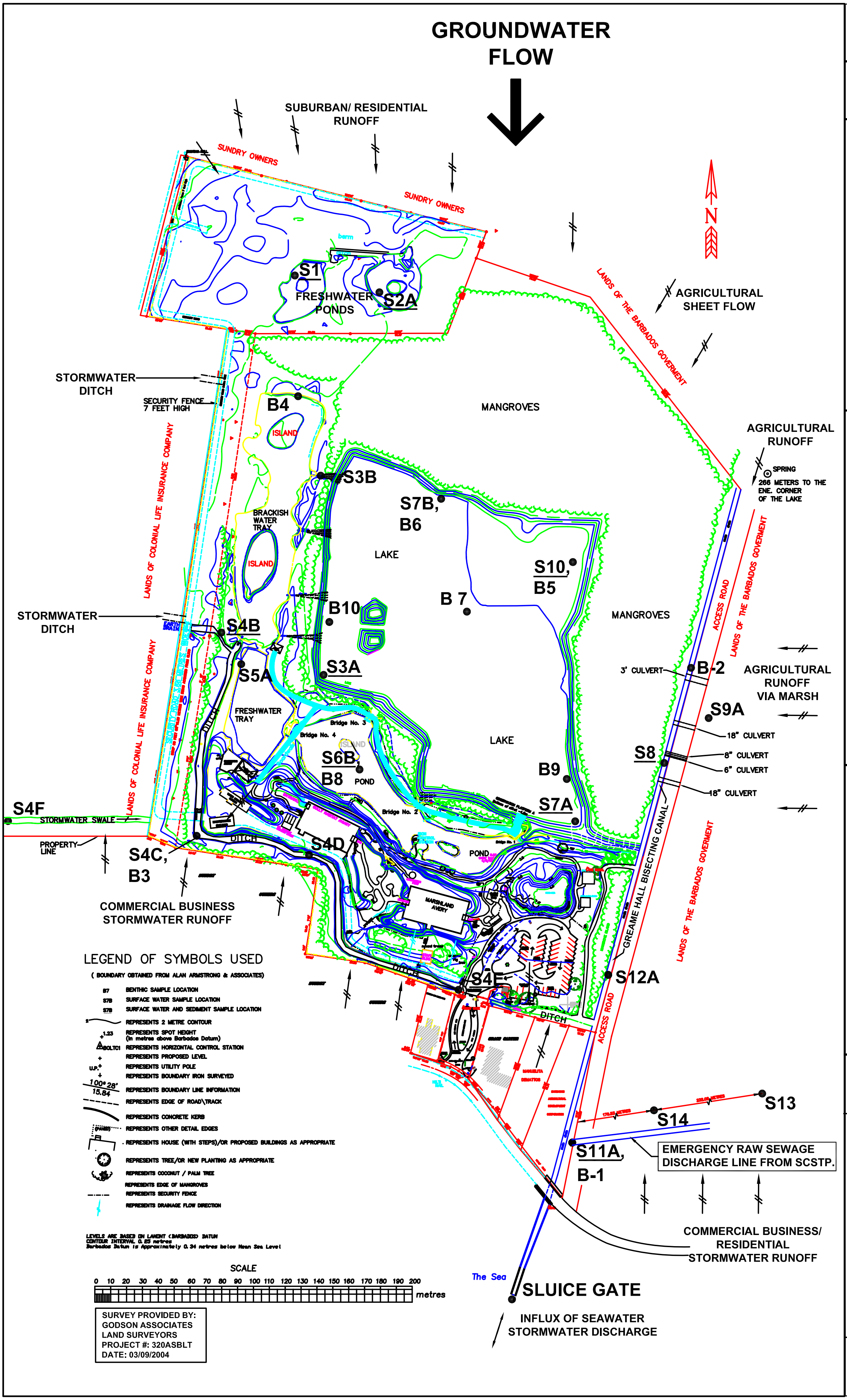
http://www.ramsar.org/cda/en/ramsar-pubs-annolist-annotated-ramsar-16727/main/ramsar/1-30-168^16727_4000_0__

# ATTACHMENT 4

## Site Plan

## GHNS

Pocket 4A – Sediment and Surface Water Sampling Locations
Pocket 4B – GHNS Surface Water Runoff Inputs
Pocket 4C – Graeme Hall Catchment Area – Land Use



SCALE: 1 cm = 1 m
SHEET: 4A
DATE: MARCH 2010
JOB NUMBER: 2010001

SURFACE WATER RUNOFF INPUTS

GRAEME HALL NATURE SANCTUARY
MAIN ROAD – WORTHING
CHRIST CHURCH
BARBADOS

CONSULTING ENGINEERS AND
ENVIRONMENTAL SCIENTISTS
ENGINEERING BUSINESS NUMBER – 2948
5119 NORTH FLORIDA AVENUE
P.O. BOX 7854
TAMPA, FLORIDA 33673
PHONE: 1-800-229-3781

ENVIRONMENTAL
ENGINEERING
CONSULTANTS, INC.

DESIGNED: R.P.
DRAWN: R.P.
CHECKED: R.E.W.

ENGINEER'S CERTIFICATION
ROBERT E. WALLACE
FL. ENG. 21608

SIGNATURE

DATE

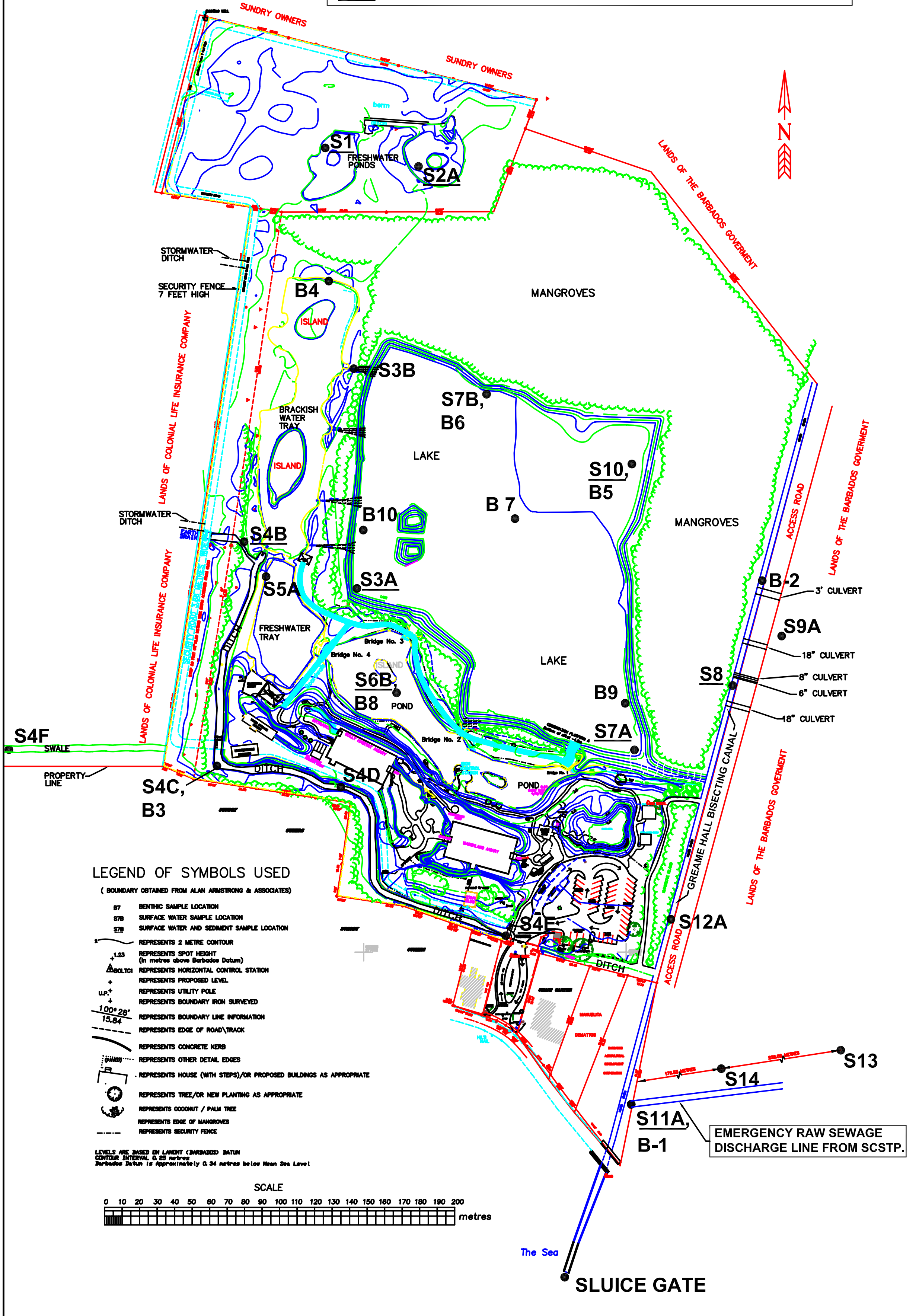
| DATE | REVISION | DRAWN |
|---|---|---|

## SAMPLING LOCATIONS.

**S1 - SURFACE WATER LOCATION.**

**B1 - BENTHIC LOCATION.**

**<u>S10</u> - SURFACE WATER AND SEDIMENT LOCATIONS.**



SCALE: 1 cm = 1 m

SHEET: 4B

DATE: MARCH 2010

JOB NUMBER: 2010001

SEDIMENT AND SURFACE WATER SAMPLING LOCATIONS

GRAEME HALL NATURE SANCTUARY
MAIN ROAD – WORTHING
CHRIST CHURCH
BARBADOS

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FL. ENG. 21608

SIGNATURE

DATE

| DATE | REVISION | DRAWN |
|---|---|---|

GRAEME HALL CATCHMENT AREA (1,156 ACRES)

| DATE | REVISION | DRAWN |
|---|---|---|
| | | |

ENGINEER'S CERTIFICATION
ROBERT E. WALLACE
FL. ENG. 21608

SIGNATURE

DATE

**ENVIRONMENTAL ENGINEERING CONSULTANTS, INC.**

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PHONE: 1-800-229-3781

DESIGNED: R.P. DRAWN: R.P. CHECKED: R.E.W.

LAND USE AREAS

GRAEME HALL NATURE SANCTUARY
MAIN ROAD – WORTHING
CHRIST CHURCH
BARBADOS

DATE: MARCH 2010
SCALE: 1 cm = 1 m
JOB NUMBER: 2010001
SHEET: 4C

# ATTACHMENT 5

## Rainfall Data
## Grantley Adams International Airport

# ATTACHMENT 5
# METEOROLOGICAL DATA
# GRANTLEY ADAMS INTERNATIONAL AIRPORT
# (From Barbados Meteorological Service)

## RAINFALL UNIT OF MEASUREMENT = mm

| YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2000** | 76.0 | 76.9 | 54.4 | 46.3 | 63.6 | 71.6 | 83.6 | 70.4 | 148.4 | 98.3 | 364.8 | 125.5 | 1279.8 |
| **2001** | 35.4 | 37.0 | 7.3 | 13.2 | 39.8 | 71.9 | 248.7 | 125.9 | 107.4 | 347.7 | 60.9 | 122.5 | 1217.7 |
| **2002** | 41.0 | 55.6 | 15.0 | 43.1 | 97.9 | 81.7 | 68.7 | 158.2 | 148.5 | 158.4 | 81.5 | 15.1 | 964.7 |
| **2003** | 48.7 | 59.3 | 21.7 | 15.3 | 11.5 | 47.2 | 113.3 | 157.1 | 75.6 | 205.5 | 203.4 | 21.1 | 979.7 |
| **2004** | 50.8 | 45.5 | 48.3 | 127.0 | 204.9 | 128.0 | 127.0 | 125.2 | 125.5 | 130.3 | 403.9 | 106.9 | 1623.3 |
| **2005** | 200.4 | 19.2 | 16.9 | 17.6 | 249.1 | 197.6 | 111.4 | 183.3 | 62.5 | 118.6 | 378.4 | 130.0 | 1685.0 |
| **2006** | 140.6 | 88.9 | 34.6 | 22.6 | 22.2 | 87.2 | 53.2 | 148.9 | 112.5 | 197.0 | 141.3 | 98.8 | 1147.8 |
| **2007** | 68.5 | 43.0 | 42.8 | 74.2 | 12.2 | 217.6 | 69.2 | 212.7 | 79.3 | 197.0 | 138.9 | 119.1 | 1274.5 |
| **2008** | 89.2 | 41.6 | 34.5 | 49.3 | 16.9 | 142.1 | 150.6 | 125.1 | 184.3 | 330.8 | 176.8 | 137.5 | 1478.7 |
| **2009** | 127.5 | 24.6 | 34.8 | 70.8 | 54.1 | 74.9 | 121.4 | 160.5 | 125.2 | 82.1 | 125.9 | 13.3 | 1015.1 |
| **2010** | 23.11* | 3.05* | | | | | | | | | | | |

**Annual Average Rainfall 2000-2009 = 1266.6 mm**
**Typical Annual Average Rainfall = 1150-1200 mm**

## AVERAGE MAX TEMP UNIT 0F MEASUREMENT = º C

| YEAR | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2000** | 28.5 | 28.5 | 28.7 | 29.8 | 30.5 | 30.3 | 30.9 | 31.7 | 29.7 | 30.7 | 29.3 | 28.9 |
| **2001** | 28.6 | 28.5 | 29.3 | 30.0 | 30.8 | 31.0 | 30.7 | 30.7 | 30.9 | 30.2 | 30.7 | 29.8 |
| **2002** | 29.3 | 29.1 | 29.9 | 30.6 | 30.6 | 30.7 | 30.9 | 30.8 | 30.9 | 30.6 | 30.0 | 29.9 |
| **2003** | 29.9 | 29.4 | 29.8 | 30.6 | 31.1 | 31.2 | 30.8 | 31.1 | 31.6 | 31.1 | 30.8 | 30.0 |
| **2004** | 29.4 | 29.2 | 29.6 | 30.1 | 29.8 | 29.9 | 30.2 | 30.7 | 31.2 | 31.5 | 30.4 | 29.6 |
| **2005** | 28.7 | 30.0 | 30.8 | 31.3 | 31.4 | 30.7 | 30.8 | 31.3 | 32.0 | 31.7 | 30.3 | 29.4 |
| **2006** | 28.9 | 28.7 | 29.7 | 30.5 | 31.4 | 31.5 | 31.3 | 31.5 | 31.8 | 31.5 | 30.5 | 29.6 |
| **2007** | 29.1 | 29.5 | 29.9 | 30.3 | 31.2 | 30.6 | 30.6 | 30.5 | 31.1 | 30.8 | 31.1 | 29.7 |
| **2008** | 29.1 | 28.8 | 29.2 | 29.5 | 30.5 | 30.6 | 30.6 | 31.1 | 31.1 | 30.9 | 30.6 | 29.3 |
| **2009** | 29.0 | 29.0 | 29.0 | 29.9 | 30.4 | 31.1 | 30.7 | 31.0 | 31.1 | 31.5 | 30.6 | 30.4 |
| **2010** | 30.5* | 30.4* | | | | | | | | | | |

* - Taken from www.tutiempo.net

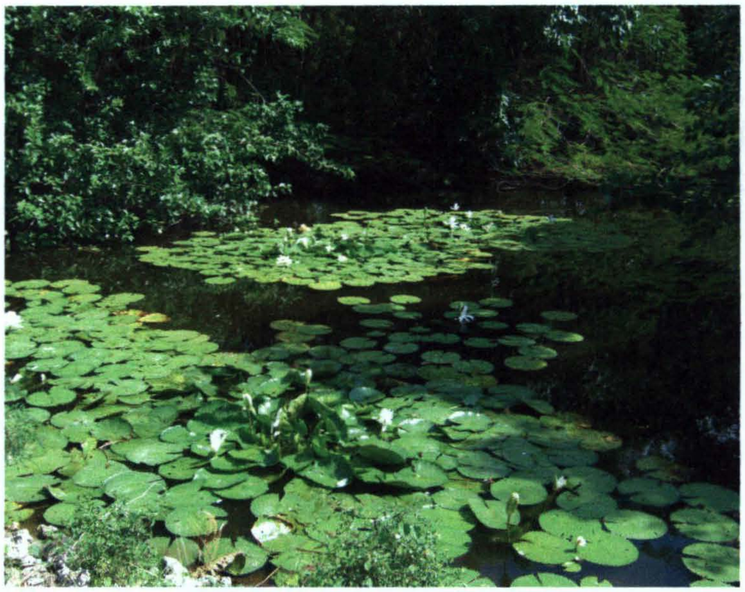
# ATTACHMENT 6

## Photographs

Lake Looking northwest

Connection between southeast corner of Lake and South Pond

Stormwater inlet from west to Sanctuary's west Stormwater Ditches



Freshwater Pond

Pump in Springs at Freshwater Pond

Low water condition in Freshwater Pond

Brackish Tray looking southwest

South Pond

Freshwater Tray looking South

Algae in South Stormwater Ditch

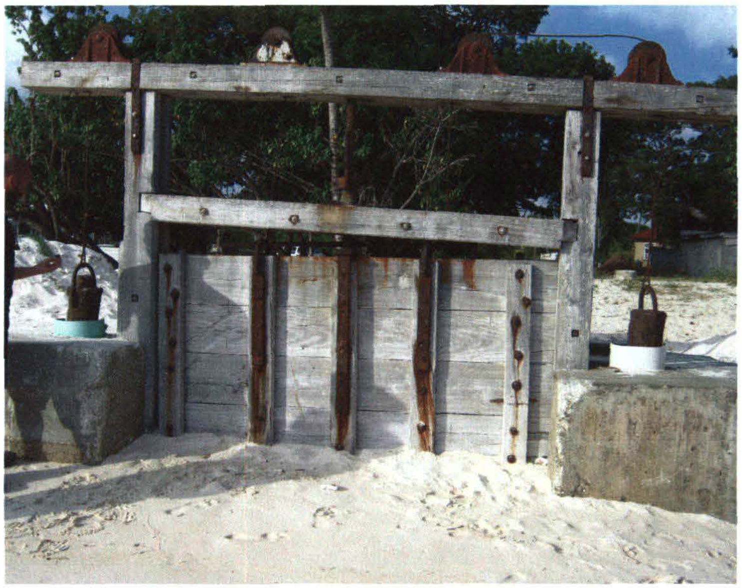
Agricultural fields north of Graeme Hall Swamp, looking south

Canal and sluice gate south of HWY 7, looking south

Stormwater inlet into canal, south of HWY 7

Dead crab in canal, south of HWY 7.

Canal, looking north towards HWY 7.



Sluice Gate, looking north

f sluice gate: left showing mounded beach sand; right showing mounded sanc

Debris in canal at Sluice Gate

Bisecting Canal

ccess Road to Sewage Treatment Plant and lift station for sewage, looking ea

Ends of 2-8" emergency discharge pipes

Dischrage point into Bisecting Canal from emergency discharge pipes

Exposed mangrove roots in Bisecting Canal

West end of culvert from freshwater marsh into Bisecting Canal


Beach area near Sluice Gate, looking east


Sewage Treatment Plant, looking north


Freshwater Marsh looking northwest


Freshwater Marsh looking west


Mangrove island with egrets

ve plant and low water conditions at northwest connection between Lake and

Tide lapping up to Sluice Gate

Smoke over lake from brush fire in Freshwater Marsh, looking east

Storwater Ditch in southwest corner of Sancturay, looking south

# ATTACHMENT 7

## Graeme Hall Swamp
## Flood Plain Elevations for Various Storm Events

Table 2-6 and Excerpts from Report
Barbados Stormwater Drainage Study - 1996
Cumming Cockburn Ltd.

## Graeme Hall Swamp Flood Levels

| Recurrence Interval (years) | Estimated Flood Level* | |
|---|---|---|
| | 3 Hour Storm (m) | 24 Hour Storm (m) |
| 2 | 0.45 | 0.54 |
| 5 | 0.50 | 0.67 |
| 10 | 0.55 | 0.81 |
| 20 | 0.60 | 0.98 |
| 50 | 0.70 | 1.29 |
| 100 | 0.83 | 1.60 |

* Assumes the normal water level in the swamp prior to the storm event is 0.40 m and no out-flow during the storm.

BARBADOS STORMWATER DRAINAGE
STUDY 1996

MAIN REPORT

CUMMING COCKBURN LTD
ERROL CLARKE ASSOCIATES LTD
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CHARLESWORTH & ASSOCIATES

be required for major flood events, e.g., larger than the 2 year storm). The environmental concerns would be similar to those noted in alternative (b) above. .

Based on a review of the operation schedule of the existing sluice gate and the pumping capacity of the proposed sewage treatment plant it would appear that in order to maintain a relatively constant water level within the swamp during the rainy season the pumps must run at a peak level on a daily basis (off peak hours only). The only possibility of reducing the operation time is to increase the pumping capacity of the new sewage treatment plant. It is estimated that the proposed pumping option would provide floodproofing protection up to the two year event. The existing sluice gate would continue to be maintained and would act as an emergency overflow during the more infrequent rainfall events.

Assuming that the configuration of the overflow manhole is modified, this option could easily be tested as part of a pilot project subsequent to the completion of the STP.

### 3) *Outlet Pipe To The Sea*

The second option to provide drainage of excess flows from the swamp would be to construct an outlet pipe for gravity drainage into the sea beyond the coral reef. The estimated length of pipe is 400m. A drop inlet structure would be constructed within the swamp which would convey flow to a 600 ⌀ pipe that would extend into the sea. The exact location and extent of the pipe would have to be confirmed through a more detailed field and technical assessment. The estimated drawdown time for a 24 hr rainstorm event is two days. For the more infrequent events the existing sluice gate would have to be operated in order to minimize increases in upstream water levels. The level of protection could be increased to approximately a 20 year design event if the outflow pipe diameter was increased to 900 mm. This option would eliminate the need to operate the sluice gate on a continuing basis. It would provide unrestricted outflow with the mixing of swamp effluent and sea water occurring beyond the beach area.

Instead of having a gravity drainage outflow system to the sea, a pumping station could be constructed upstream from the existing sluice gate. This station would pump excess storm water from the swamp to the sea via a forcemain. The drawdown characteristics of the system would be similar to that of the gravity fed system. It could however, be reduced by increasing the size of the pump. This option has the advantage of a reduced outlet pipe size but a disadvantage in regard to future ongoing maintenance and operation costs.

Proposals for further development within the swamp area to enhance tourist and site-seeing opportunities are currently being considered. For example, a current proposal for development of a bird sanctuary and aviary is being considered for the area just west of Western Lake. (It is our present understanding that the birds could be mainly non-native species and would be confined and not part of the natural environment - although any aspects of the proposal await approval). This would include boardwalks, viewing areas and other tourist facilities.

Environmental

The main environmental features of the wetland are summarized in Table 2.7. This information is summarized from previous environmental investigations of the swamp (Reid, Crowther, 1990) and is intended to support the general view that the Graeme Hall Swamp is an important natural resource in Barbados.

A comparison of environmental features in the wetland mapped Circa 1980 with an interpretation of 1991 aerial photographs of the same area has revealed several changes in the Graeme Hall swamp area. In general, the changes are summarized as follows:

- a feature previously referred to as Eastern Lake appears to have been significantly altered by a complex of drainage canals.
- drainage canals appear to have been extended to the limits of a sedgeland zone on the east side of the wetland. An area previously referred to as the Sedge Pool appears to have become drier, with some increase in sedges extending to the north of the original feature. Other sedgeland areas north and west of Western Lake appear to have become more overgrown by brush and trees.
- some grassland areas have been lost to minor urban expansion while shrublands to the West and South of Western Lake appear to have been cleared to grassland.
- a small portion of the Red Mangrove complex on the east side of Western Lake appears to have been removed and the White Mangrove stand extending from the east of Western Lake appears to have had its most eastern 1/3 replaced with drainage canals.

It should be noted that many of the features in the swamp have depended on maintenance activities undertaken in the past. Pruning of trees in the shooting areas previously controlled growth, etc.. Local residents have also noted an increase in growth of mangroves and a general feeling that the amount of water surface area has increased in the swamp in recent years.

The connection between the wetland and the sea is considered by local environmentalists to be of some environmental significance[1]. This connection is presently intermittent and occurs when the sluice gates are open. This allows the two way movement of fish and the outflow of water stored in the swamp. The latter is also considered to be of benefit to the near shore ocean environment[1].

Discussions with the Coastal Conservation Unit have indicated a concern in regard to the quality of storm water and potential sanitary sewage releases to the nearshore areas. The first concern is a potential liability issue with respect to the health of swimmers and users of the beach areas near the storm canal outlet. The second concern is related to potential water quality impacts on the near shore environment and the coral reef which is situated approximately 400 m offshore (Delcan, 1995). If a submerged discharge were to be considered, the coastal conservation unit has indicated a preference to extend the discharge pipe beyond the reef.

South Coast Sewerage Project

The project area includes the South Coast of Barbados from Bay Lands in the West to Oistins in the East. This project is currently under construction and will ultimately provide a sanitary sewage collection and disposal system for an area of about 550 ha extending approximately 10 km along the coast.

2.5 sq mile 1360 Acre 1 hectar = 2.47 Acre

The sewage treatment plant is currently being constructed on the northeast side of the swamp adjacent to the agricultural lands.

The influent and effluent pipelines have been routed around the edge of the swamp in order to minimize impacts on the swamp. Inflows to the plant will be by gravity sewer (600 - 675 mm $\phi$ at a depth of about 5 m) and outflows will be pumped via forcemain out to sea off Needhams' Point. (750 mm $\phi$ forcemain at a depth of 1.5 m). The plant is designed to treat an initial

2550 l/

---

[1] Personal Communication; South Coast Sewage Project, July 1996.

[1] Personal Communication, Dr. L. Nurse, May 1996

2.38 MGD $\quad$ 1 $m^3$ = 264 gal

average daily flow of 9000 $m^3$/d with provision to increase the future treatment rate to 11,300 $m^3$/d.

2,98 mgd

An emergency overflow will be constructed for the sanitary sewer influent pipeline. The overflow would discharge to the drainage canal from the swamp just to the north of Highway 7. In times of extreme emergency, raw sewage will overflow into this canal. Such an event could occur if:

- there is both a utility power failure and the stand-by generator at the treatment plant fails to operate.
- there is a catastrophic failure of the pumping equipment at the plant.
- after pump failure, the available storage in the sanitary pipes and manholes is exceeded, and the head builds up to exceed the overflow elevation in the overflow manhole.

The overflow elevation is presently anticipated to be 0.45 m[1]. During construction of the treatment plant, the dewatering operation at the construction site has required significant pumping to the swamp. This has resulted in a rise in the normal water level of the swamp to about 0.7 m[2]. (The latter elevation is also similar to water levels that occur in the swamp subsequent to rain storm events). The higher water levels during the dewatering operations have required frequent operation of the sluice gate (once every 2 - 3 days) to avoid flooding of developed areas around the edge of the wetland. It is also noted that, due to the increased frequency of operation of the sluice gate, that the blockage by sand of the outlet channel from the sluice gate to the sea has been reduced.

The outlet channel location was chosen to receive emergency overflows since the outflow from the swamp is controlled by the sluice gate. Therefore, it was concluded that if an emergency overflow were to occur, that the discharge to the sea could be controlled and monitored in order to minimize environmental impacts. It was also concluded that "After such an event, some clean-up of the channel banks may be required to remove plastics, rags, and other objectionable floating debris"[3]

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[1] Reid Crowther - South Coast Sewerage Project Emergency Overflow Structure Details

[2] Reid Crowther - Personal Communication, May, 1996.

[3] Reid Crowther Inc. "South Coast Sewerage Project" - Environmental Study of the Treatment Plant Site", Barbados, Ministry of Health, 1990.

It is possible that the operation of sluice gates for flood control purposes might conflict with the potential need for the gates to remain closed during a catastrophic failure of the pumping system at the treatment plant. (i.e., should such a failure occur during or immediately after a storm event). We also note that the end of the overflow pipe to the canal would be fitted with a check valve to prevent backflow from the swamp to the treatment plant (i.e., for conditions when the water level in the swamp is higher than 0.45 m). Regular inspection and maintenance of this check valve will be required to ensure its proper maintenance.

improved by the construction of infiltration galleries. A typical subsurface infiltration trench/gallery is shown on Figure 2.15.

### *(b) Graeme Hall Swamp*

While a few low-lying lands experience frequent flooding, the present flood damage potential is considered to be low. On the other hand the Graeme Hall Swamp is considered to be an unique environmental feature (see Section 2.3.5 (b)), and therefore the water levels should be maintained at a fairly constant elevation to ensure that it's ecological condition is preserved.

The existing flood prone development which is located primarily adjacent to Highway 7, should be protected from potential flooding either by the placement of fill on the lots, raising of the buildings, or by construction of a low dyke to be located between the property and the swamp, which would include raising a portion of the path along the bank of the outlet canal near Highway 7. A low dyke is recommended to be constructed to a minimum elevation of 1.0 m which would provide sufficient protection against nuisance flooding and most larger flood events. (A dyke constructed to an elevation of 1.6 m would be more intrusive although it would afford protection up to about the 100 year event). Surface drainage for some areas behind the dykes would have to be provided by connection to the proposed sanitary sewer. Alternatively, the sluice gate could be moved to the east side of Highway 7 to allow drainage of the lands between the dyke and Highway 7. In some cases, property acquisition should also be considered as a viable alternative.

If future development is proposed in close proximity to the swamp area it should be flood proofed by construction of roads and first floor elevations above the flood risk level. Based on the results of a detailed hydrologic and hydraulic analyses a flood proofing elevation of 1.6 m is recommended for consideration. A detailed environmental impact statement should also accompany any development applications in the wetland.

As discussed in Section 2.3.5(b), the release of water stored in the swamp also poses some environmental concerns in regard to adjacent tourist operations and the marine environment.

With regard to the drainage of excess water from the swamp, the following approaches are considered:

1) Improve the operation of the existing sluice gate, in conjunction with the installation of dykes.
2) Construct a gravity fed outlet pipe with discharge to the STP during off peak hours.
3) Construct a gravity fed outlet pipe with discharge to the sea.

The feasibility of these approaches are discussed in the following sections.

### 1) *Sluice Gate*

If the dyke or fill placement recommended above is undertaken, the potential for flooding existing developments would be significantly reduced. The continued operation of the existing sluice gate could then be undertaken in a more flexible manner since more storage would be available in the swamp. (i.e., water levels could be allowed to rise higher before the sluice gates need to be operated).

The use of a pump to provide a jet of water to hydraulically flush sand accumulations from the sluice gate to the sea could also be given some consideration. This would require extension of the existing concrete channel for a distance of approximately 40 m. This approach might reduce the noise associated with the night-time operation of backhoes and could result in a faster removal of the sand accumulations. It is recommended that a pilot project be undertaken to test the effectiveness of this alternative for the removal of sand in conjunction with continued operation of the gate.

It is also recommended that the monitoring program should be continued (DelCan, 1995) to record water levels in the swamp, gate operation, and outflow volumes.

### 2) *Outflow To The STP Pumping System*

The sanitary sewage overflow manhole, which is to be provided upstream from the existing sluice gate, could be modified to allow the possibility of drainage of excess water from the swamp via the STP. The pumps at the sewage treatment plant will have a capacity of 10,900 $m^3$/day (24 mgd.), which is in excess of the anticipated sanitary sewage flow. Excess drainage from the wetland could as a result be handled during off-peak hours via the proposed gravity sanitary sewer to the STP and pumped to the sea off Needham's Point. This would maximize use of the proposed STP pumping facilities, avoid the construction of another pipe outfall, and minimize the required operation of the sluice gates. (Operation of the sluice gates would still

A concern has been expressed related to an increased potential for higher levels of bacteria on the beaches and the possibility of nose and throat infections of swimmers. Todate, there is no data to support this concern.

If this option is selected the undertaking of an environmental study would be required to determine if existing storm water discharges are beneficial to the sea-grass, etc.. It is also noted that the drainage area and hence, the volume of storm water temporarily stored and released from the swamp is significantly smaller than historical releases due to changes in the drainage area directly contributing to the swamp.

The construction of an outlet pipe would also further impact the surface connection of the swamp and the sea, and consequently the potential movement of fish and other aquatic animals.

Finally, it is recommended that should an extreme emergency condition where sanitary sewage is discharged to the swamp outlet area from the overflow manhole, that the sluice gate should remain closed if possible. (This becomes more feasible if the flood protection dyke or fill is placed as previously recommended). Subsequent to re-starting the pumps at the sewage treatment plant, the clean-up of spilled sewage should be undertaken by draining back through the overflow manhole to the STP (or by using portable pumps if needed). In our opinion, this procedure for clean-up of spilled sewage should be utilized whether or not the off-peak usage of the STP pumps is considered to be feasible for handling the excess drainage from the wetland.

For all of the outlet pipe options discussed above, the outlet pipe could have an impact on the littoral drift pattern. Prior to the implementation of any outfall works, these impacts must be assessed during the final design. Of special consideration is the potential impacts of the structure on the sand accretion and deletion within the beach area.

## Conclusions and Recommendations for Graeme Hall Swamp

For Graeme Hall Swamp two flood control alternatives have been given for consideration (Based on the previously described tasks) and cost estimates provided in Section 3.2.5. The main components of each are identified as follows:

*Alternative A*

- Construct an earth dyke to protect existing development. New development below an elevation of 1.6 m within or adjacent to the swamp is to be prohibited.

- Extend existing concrete lined outlet channel by approximately 40 m and undertake pilot projects to test effectiveness of using water jets for sand removal and use of STP pumping system as an overflow. The residual need for the sluice gate is to be monitored as well as water levels and outflows from the swamp.

*Alternative B*

- Undertake environmental investigations to confirm appropriate location for outflow of swamp effluent to the sea. The study would confirm the potential impact of pipe discharge on the beaches, sea-grass and coral reef.

- Construct a drop inlet gravity system with the outflow pipe to the sea. The length of the outflow pipe would be determined based on the environmental investigation.

It is recommended that Alternative A first be considered for implementation as it represents the most economical approach. If it is found that the flood control objectives are not being satisfied then consideration could be given to implementing Alternative B.

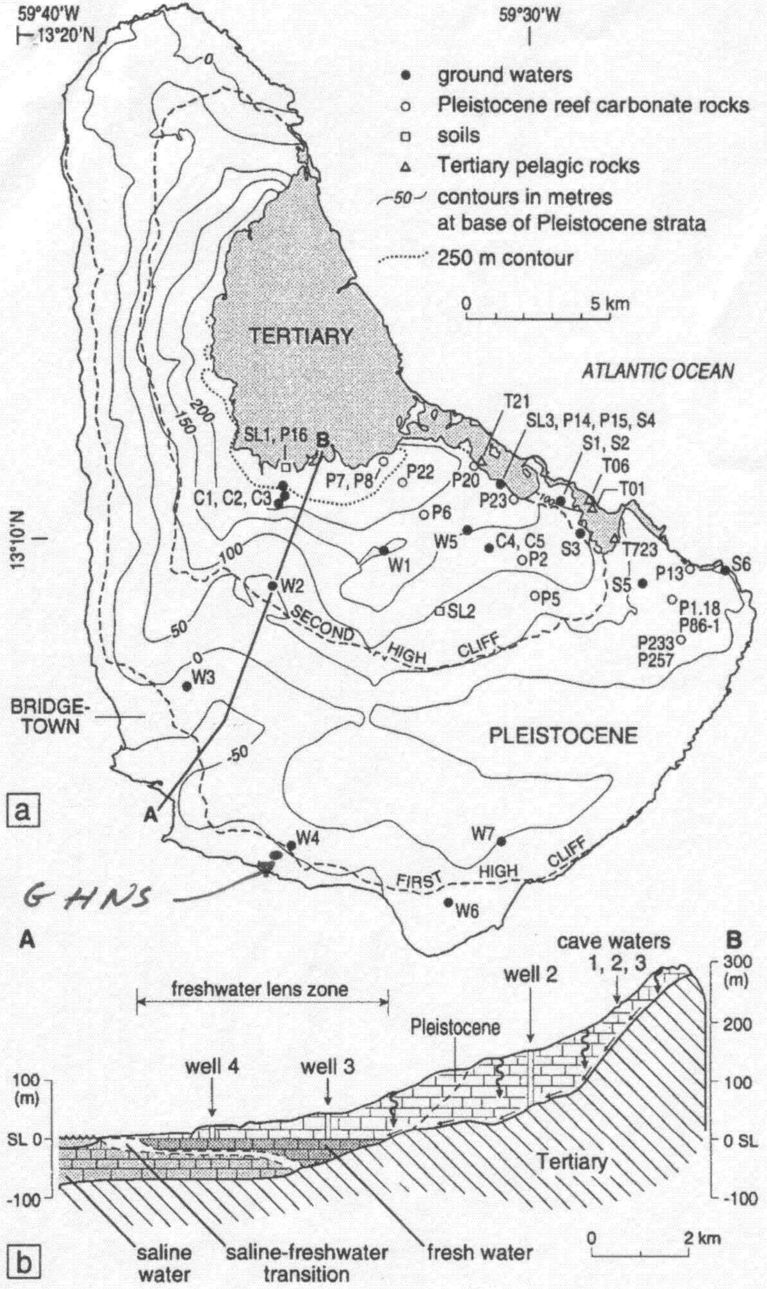
### 3.2.5 Construction Cost Estimates

Construction cost estimates have been prepared for the proposed structural measures for both the "Nuisance Flood Hazard Areas" areas and for the "Major Flood Hazard Areas". The cost estimates as provided in Tables 3.2 and 3.3 respectively are based upon preliminary concepts and would require refinement at the pre-design and/or final design stages. Preliminary costs for land acquisition associated with the diversion channels have been included in the estimates. The estimates provided do not account for such items as; special construction requirements, legal and appraisal fees, detailed soils, hydrogeological or environmental investigations, monitoring, etc..

# ATTACHMENT 8

## Geologic Cross-Sections

Source: Banner, J., Musgrove, M, Capo, R.

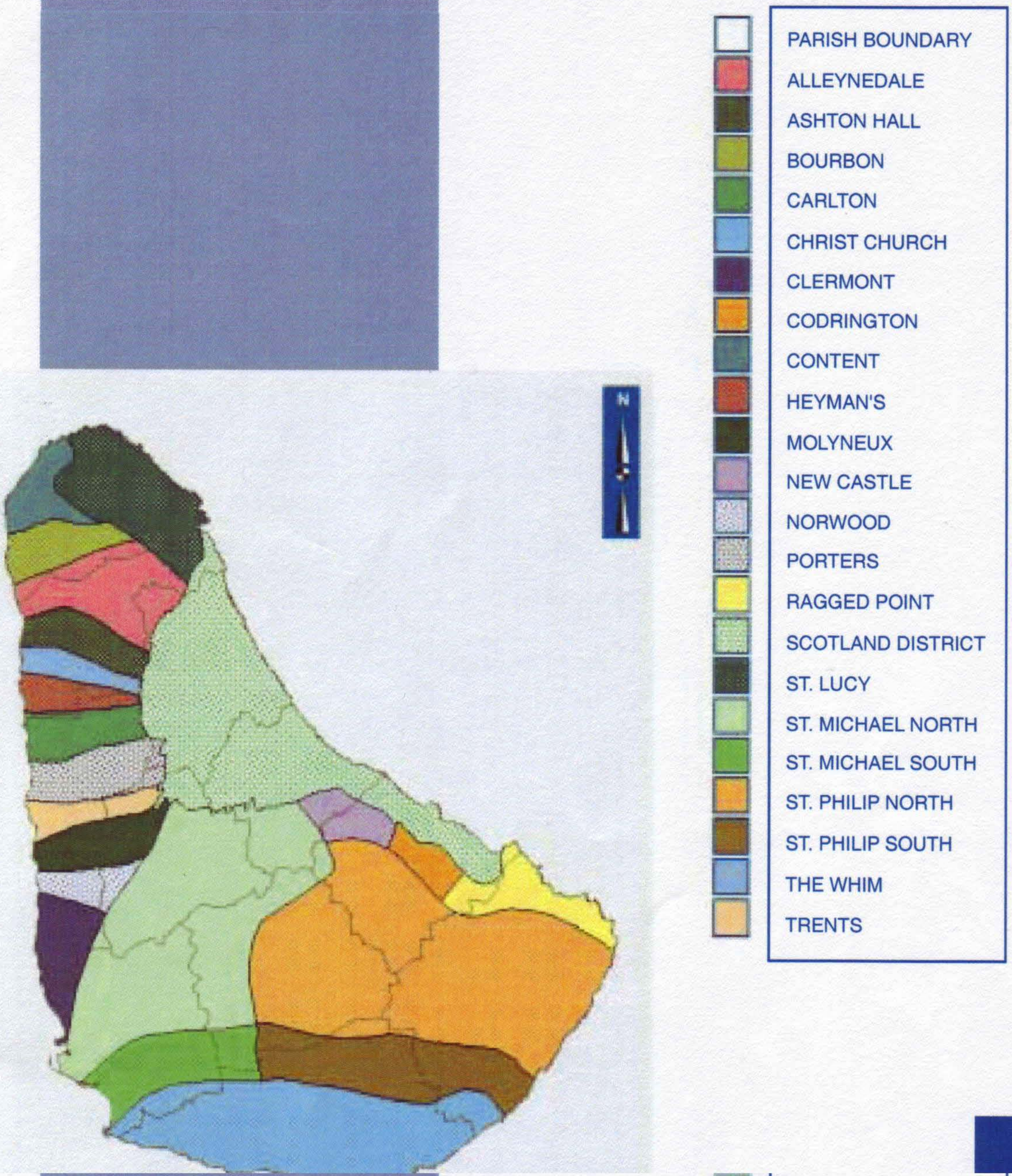

59°40'W
13°20'N
59°30'W
● ground waters
○ Pleistocene reef carbonate rocks
□ soils
△ Tertiary pelagic rocks
-50- contours in metres at base of Pleistocene strata
250 m contour
0 5 km
ATLANTIC OCEAN
TERTIARY
13°10'N
T21
SL3, P14, P15, S4
S1, S2
T06
T01
T723
SL1, P16
B
P7, P8
P22
P20
P23
C1, C2, C3
P6
W5
C4, C5
S3
W1
P2
S5
P13
S6
W2
P5
P1.18
P86-1
P233
P257
SL2
SECOND HIGH CLIFF
W3
BRIDGE-TOWN
PLEISTOCENE
0
50
100
150
200
-50
a
A
W4
W7
FIRST HIGH CLIFF
G HNS
W6
A
B
cave waters 1, 2, 3
300 (m)
200
100
0 SL
-100
well 2
freshwater lens zone
Pleistocene
well 4
well 3
100 (m)
SL 0
-100
Tertiary
saline water
saline-freshwater transition
fresh water
0 2 km
b

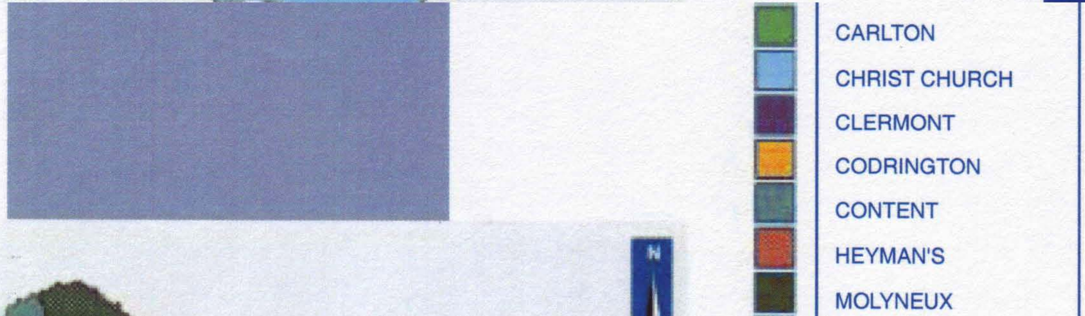
# ATTACHMENT 9

## Groundwater Catchment Areas

Source:  State of the Environment Report 2000

# Map 5.2: Ground Water Catchments



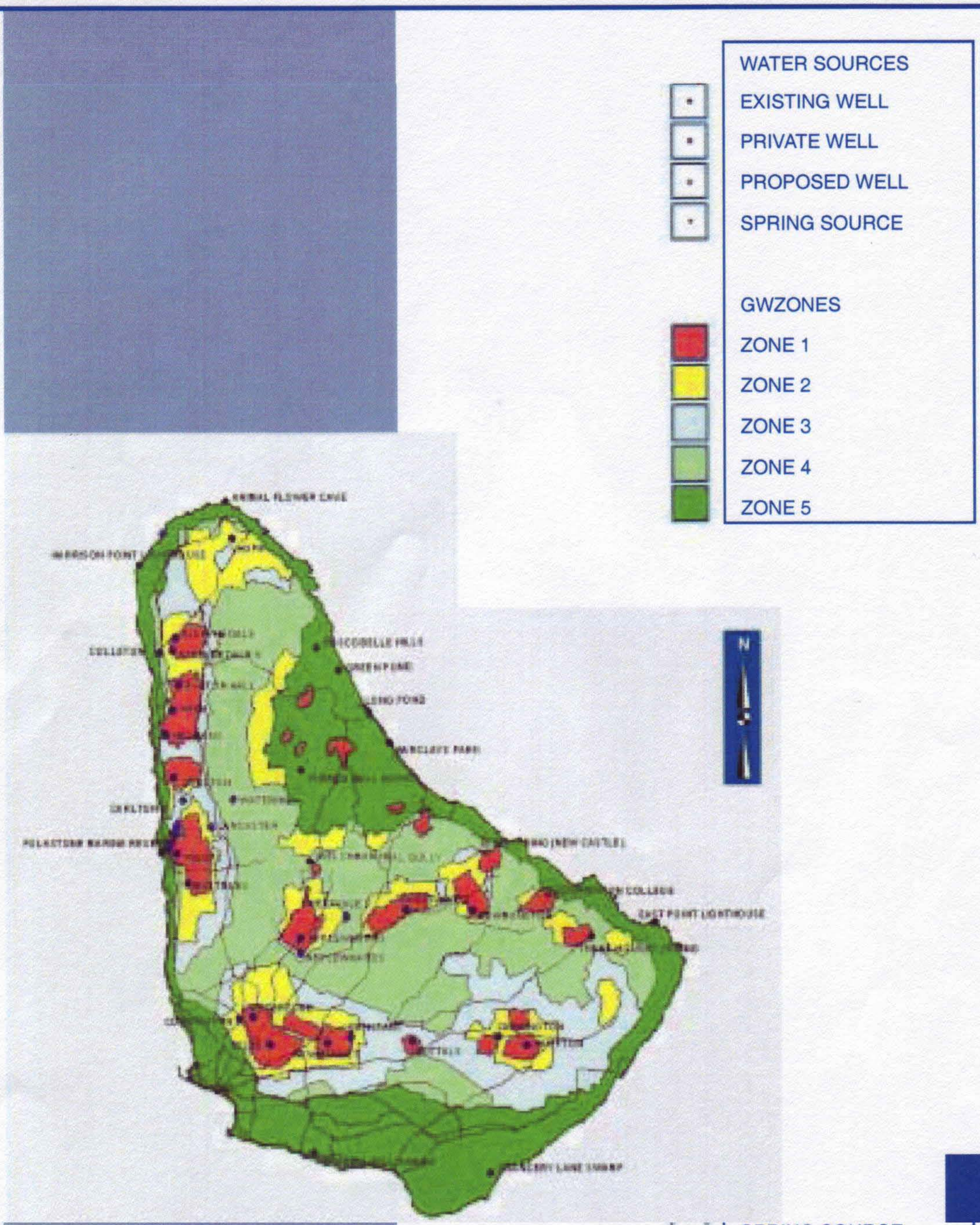


# ATTACHMENT 10

## Groundwater Protection Zones

Source:  State of the Environment Report 2000

# Map 5.3: Ground Water Zones, Wells & Springs



SPRING SOURCE

GWZONES

ZONE 1

ZONE 2

ZONE 3

ZONE 4

# ATTACHMENT 11

## Mangrove Quality Assessment

Angelo Tulimieri
Environmental Scientist

# Mangrove Quality Assessment
# Graeme Hall Nature Sanctuary Barbados

This report is Attachment 11 (eleven) in the parent document (Wallace, Robert and Richard Pryor, *Wetland Ecosystem Assessment for Graeme Hall Nature Sanctuary Barbados*, Environmental Engineering Consultants, Inc. Tampa, Florida, 2010). Part I presents a scientific report and Part II a descriptive report.

# PART I

## Mangrove Quality Assessment A Freshwater Transformation Graeme Hall Nature Sanctuary Barbados

The findings presented here should be reproducible if performed under similar environmental conditions.

# Mangrove Quality Assessment A Freshwater Transformation
# Graeme Hall Nature Sanctuary Barbados

by Angelo Tulimieri, Environmental Scientist

## Abstract

The ecology of how the biology has been or may be affected by changes in hydroperiod and salinity are described for the mangrove wetland and 12-acre lake complex (mangrove ecosystem) in the Graeme Hall Nature Sanctuary within the Barbados' Graeme Hall preserve. Quantitative and qualitative data were collected. Dominant biological species and biological indicators were identified and as much as possible photo documented. History, scientific references and authoritative witness accounts were considered. Almost every biotic and abiotic indicator found pointed to an advanced state of freshwater transformation in the Sanctuary mangrove ecosystem that by definition should be an intertidal wetland dominated by salt tolerant flora and fauna. A freshwater wetland hydroperiod was found instead of a seawater tidal flux which had been absent since August 2006, and irregular and infrequent before that. Water salinity in the "bisecting" canal went from 29-34 ppt in 1986 after the gate was opened to 1.3 ppt currently. The benthic saltwater macroinvertebrates in the Sanctuary's 12-acre lake had been replaced with freshwater species. Emergent freshwater plants were found dominating the "bisecting" canal and the other wetlands in Graeme Hall except for the remnant mangrove forest on government land where nonetheless spikerush (*Eleocharis mutata*) had infiltrated outer mangrove fragments. The average salinity in Graeme Hall's five wetlands, which includes the government's mangrove, was 1 ppt whereas in the Sanctuary's mangrove-lake ecosystem it was 2 ppt. The 12-acre lake is shallow enough to support vascular plants but none were due possibly to numerous herbivorous tilapia inhabitants. Mangroves grow well in freshwater but only dominate in saltwater and brackish water. Parts of the Sanctuary's mangrove ecosystem have been transformed into a freshwater ecology due the prolonged absence of seawater inputs. If freshwater conditions persist then over time the Sanctuary's mangroves may be out competed by freshwater plants. If so, then the Sanctuary's mangrove ecosystem which supports an internationally recognized Caribbean avian flyway stopover and Barbados' most important wading bird habitat will be lost.

# Introduction

The mangrove ecosystem within the Graeme Hall Nature Sanctuary is being transformed into a freshwater wetland due to a prolonged absence of seawater exchange. This freshwater transformation was discovered in February 8-20, 2010, during a study to determine if raw sewage inputs correlated with the fish kills that had occurred over the years in the Sanctuary. For that study, water and sediment quality samples as well as benthic community samples were collected and the results analyzed, synthesized and reported (Wallace, R. and R. Pryor, 2010).

The Sanctuary is located within Graeme Hall in Barbados (13°04'N 059°35'W). In 2006, Barbados and the Ramsar Convention on Wetlands designated 33 hectares (81.5 ac) of "naturally created coastal wetland with … the largest healthy mangrove areas left on the island" as a Wetland of International Importance within Graeme Hall (Ramsar site no. 1591) (www.ramsar.org), and Ramsar noted at that time that this area "has been proposed as a National Heritage Site." The 33 ha included a "12-acre artificially-created lake that constitutes the largest body of inland water on the island." Ramsar also noted that 84 bird species and 20 fish species had been identified associating with the "mangrove forest" and 12-acre lake." These species included mainly wading and or migratory bird species and at least one marine species, tarpon (*Megalops*). The area is also well known as a Caribbean stopover for migratory birds in the North and South American flyway.

Before this study, the freshwater transformation of the Sanctuary's mangrove ecosystem was unknown or unreported. If the freshwater transformation continues then the mangroves may be replaced by freshwater plants and if left unchecked then this nationally and internationally recognized wading bird community habitat will be lost.

No historic scientific baseline data was found with which to compare the current findings except for water salinity values from 1986 and 2002. Reported, CARICOMP has been measuring mangrove primary productivity for years. However, mangroves are halophytes No research was found on internet search engines regarding strictly freshwater mangrove wetlands. However, telling references were provided by the Smithsonian Marine Station at Fort Pierce (Florida, USA), "Simberloff (1983) and Tomlinsion (1986) suggested that one reason mangroves do not develop in strictly freshwater communities is due to space competition from freshwater vascular plants. By growing in saline water, mangroves reduce competitive threat, and thus are able to dominate the areas they grow in."

The Sanctuary's mangrove ecosystem hydroperiod is supplied by rainfall and drainage basin runoff. An 80 year old sluice gate on a narrow, even older "bisecting" canal would open periodically to allow the exchange of seawater between the mangrove ecosystem and the Caribbean. ("Bisecting" describes the effect of bifurcating the once contiguous Graeme Hall mangrove forest into two parts that now only connect during flood or seasonal high water periods.) The sluice gate has been closed since if fell into disrepair in 2006 (See Sluice gate, Part II, Attachment 11).

The evidence of the mangrove ecosystem's freshwater transformation is presented below and may be of benefit to the decision makers that control the seawater connection as to whether or not the freshwater transformation will be continued or reversed.

## Methods

For purposes of this study, an ecosystem boundary was created around the Sanctuary's mangrove wetland and 12-acre Lake that had bee carved from the mangrove forest decades ago, and a field study was conducted. The mangrove ecosystem's floral and faunal species and associations were identified. Salinity measurements were acquired for the six wetlands located within Graeme Hall and compared to the salinity in the Sanctuary Lake. The lake's freshwater macroinvertebrate benthic community was identified by qualified scientists. The mangrove wetland hydroperiod was identified based on stain lines, which is a standard method. Wetland terminology as well as flora and fauna species inventories are included at the located in Part 2, Attachment 11 (Wallace and Pryor, 2010).

The methods for collecting salinity measurements and benthic community samples, as well as statistical analysis of the latter, are detailed in *Wetland Ecosystem Assessment for Graeme Hall Nature Sanctuary* (Wallace and Pryor, 2010).

# Results

Reported are the results of the wetland identification and plant dominance, salinity measurements, hydroperiod identification, and benthic community analysis.

**Wetlands and plant dominance:** There are four wetlands within the Sanctuary and two on government Graeme Hall land although these two may be combined into one. All the wetlands were dominated by a wetland plant species (Table 1). The Sanctuary mangrove ecosystem was dominated by red mangroves (*Rhizophora mangle*) and sub-dominated by white mangroves (*Laguncularia racemosa*). The Sanctuary mangroves were verdant and healthy and the gaps in the canopy appeared to be small and few in number based on aerial photographs. The two Sanctuary waterlily ponds in the northeastern corner were each dominated by different species freshwater *Nymphaea*. The bisecting canal inside the eastern boundary was dominated by waterlily (*Nymphaea odoratus*) and arrowhead (*Sagittaria lancifolia*), both freshwater species.

Table 1. Important plant species in Graeme Hall wetlands

| Habit | Scientific Name | Common Name | Wetness Rating | Location |
|---|---|---|---|---|
| Tree | *Conocarpus erectus* | Buttonwood | FACW | Upper white mangrove forest |
| Tree | *Ficus citrifolia* | Bearded fig | FAC / FACU | Disturbed edges of Sanctuary mangroves |
| Tree | *Laguncularia racemosa* | White mangrove | OBL | Sanctuary mangrove forest |
| Tree | *Rhizophora mangle* | Red mangrove | OBL | Sanctuary mangrove forest |
| Shrub | *Cordia obliqua* | Clammy cherry | FAC? | Disturbed edges of Sanctuary mangrove |
| Herb | *Cladium jamaicense* | Sawgrass | OBL | Government marsh |
| Herb | *Eleocharis mutata* | Spikerush | OBL | Government marsh + north lily pond |
| Herb | *Nymphea odorata* (exotic) | Waterlily | OBL | North lily pond |
| Herb | *Nymphea ampla* (native) | Waterlily | OBL | South lily pond |

Remarks: (OBL) Obligate wetland species occur more than 99% of the time in wetlands.
(FACW) Facultative wetland species occur in wetlands 67-99% of the time or in uplands 1-33% of the time.
(FAC) Facultative species occur in wetlands or uplands 34-66% of the time. They tolerate wet and dry conditions.
(FACU) Facultative upland species occur in uplands 66-99% of the time or in wetlands 1-33% of the time.

The wetland(s) on the government Graeme Hall property consisted of a red mangrove forest surrounded by a marsh dominated by a freshwater spikerush (*Eleocharis mutata*). Structurally, these were two different wetlands but shared the same hydroperiod and may be considered one wetland. The outer edge of the government's mangrove appeared to be fragmenting and infiltrated by spikerush (Figure 1).

Figure 1. Government mangrove fragments infiltrated by freshwater spikerushes

(Photo by Angelo Tulimieri)

**Salinity:**

**Table 2. Salinity field measurements**

A. Sanctuary lake

| Sample Station | **S3A** | **S3B** | **6B** | **7A** | **7B** | **10** | **All stations** |
|---|---|---|---|---|---|---|---|
| Location | **Lake** | **Lake** | **South Pond** | **Lake** | **Lake** | **Lake** | **average** |
| Salinity, (ppt) - 2002 | na | na | 8.85 | 8.03 | 8.25 | 8.05 | 8.30 |
| Salinity, (ppt) - 2010 | 1.9 | 1.9 | 1.9 | 2 | 2 | 1.9 | 2 |

B. Sanctuary wetlands

| Sample Station | **1A** | S2A | **8A** | **11A** | **12A** | **All** |
|---|---|---|---|---|---|---|
| Location | **Lily pond** | **Lily pond** | **Bisecting canal (marsh)** | | | **average** |
| Salinity, (ppt) - 2002 | 1.28 | na | 3.4* | 4.55 | na | 3.08 |
| Salinity, (ppt) - 2010 | 0.6 | 0.5 | 0.9 | 1.7 | 1.4 | 0.9 |

C. Bisecting canal measured at different times

| Date | **1986** | **2001** | **2002** | **2010** |
|---|---|---|---|---|
| Bisecting Canal Salinity (ppt) | 29-34 | 0.1 | 4.0 | 1.3 |

D. Government-owned mangrove and marsh

| Sample Station | **13** | **14** | **9A** | **All stations** |
|---|---|---|---|---|
| Location | | | | **Average** |
| Salinity, (ppt) - 2002 | na | na | na | na |
| Salinity, (ppt) - 2010 | 0.5 | 0.8 | 0.8 | 0.7 |

2002/2010 Data (Attachment 16 (Wallace, R. and R. Pryor, 2010))

Salinity measurements from February 2010 were compared to those collected historically (Table 2). The average salinity in the Sanctuary's lake dropped from about 8 ppt in 2002 to about 2 ppt in 2010. The average salinity of the Sanctuary's "bisecting" canal and the two Sanctuary lily ponds dropped from about 3 ppt in 2002 to about 1 ppt in 2010. The salinity in the Sanctuary's "bisecting" canal dropped from about 31 ppt in 1986 to about 1.3 ppt in 2010.

**Wetland hydroperiod:** The hydroperiod in the Sanctuary's mangrove wetland was identified using stain lines, which is a widely accepted method. The stain lines develop at the normal seasonal high water elevation. The stain line on the red mangroves in the south pond that is connected to the lake was about 0.6 meters or less above the surface of the lake (Figure 3).

Figure 3. Hydroperiod stain lines in pond connected to south side of lake

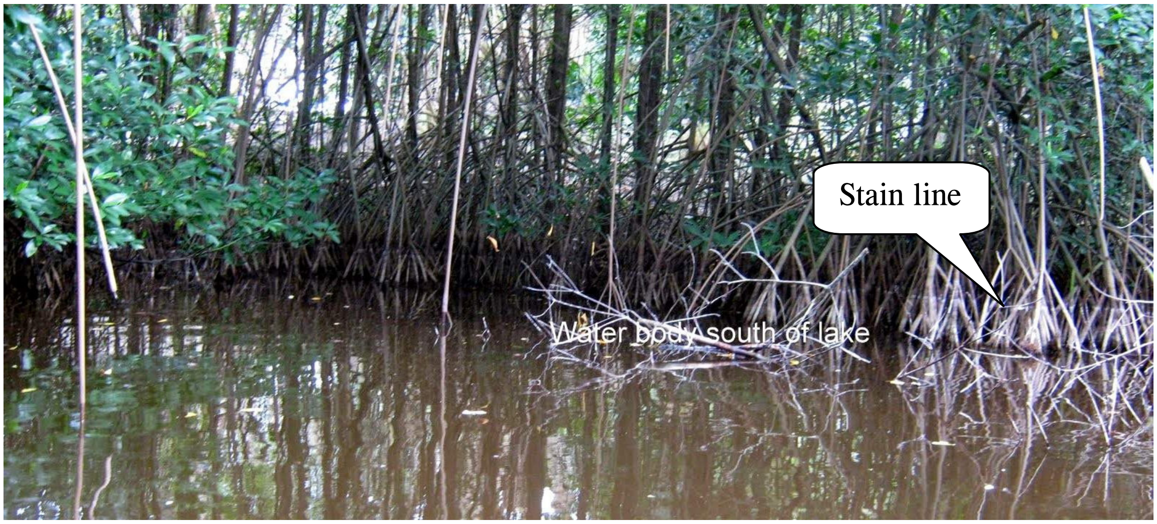
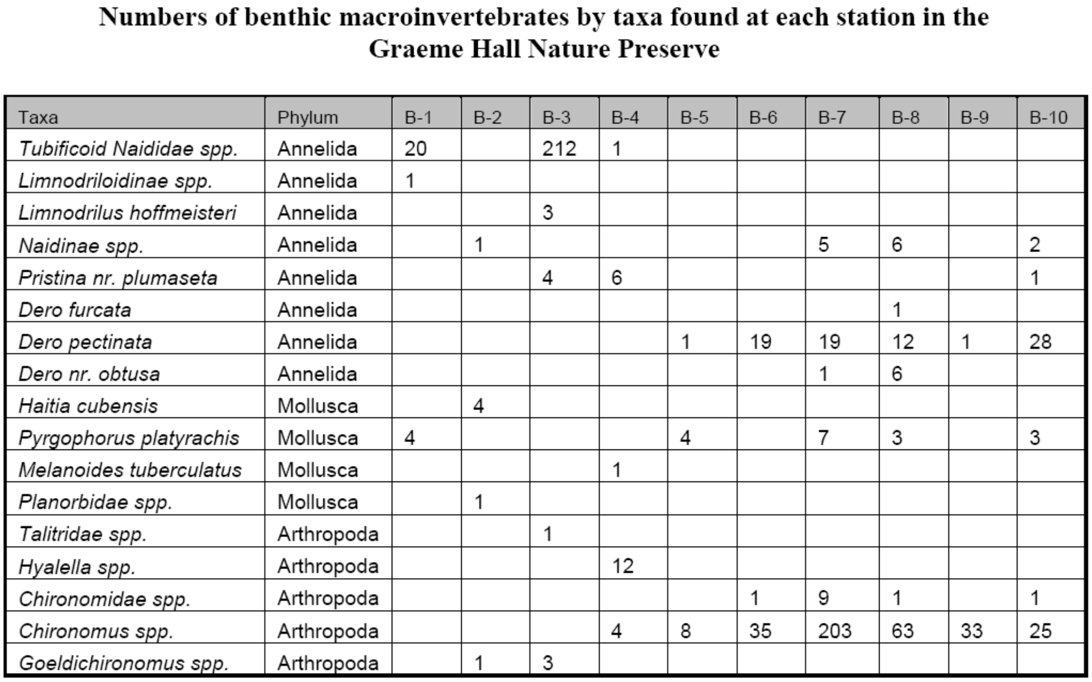


Photo and location supplied by Richard Pryor. Stain line identified by Angelo Tulimieri

**Benthic community**

Benthic community samples collected at 10 stations within the Sanctuary revealed 777 macroinvertebrates from 17 taxa that were all freshwater species (Table 3). Samples B3, B5, B6, B7, B9 and B10 were stationed within the lake and sample B8 was stationed within the open water pond that is connected to the south side of the lake. Samples B1 and B2 were stationed in the "bisecting" canal and sample B4 was stationed at the northern end of the so called "brackish" pond or "tray" (Attachment 18 (Wallace and Pryor, 2010))

Table 3. Graeme Hall Nature Sanctuary (Preserve) benthic community analysis



**Numbers of benthic macroinvertebrates by taxa found at each station in the Graeme Hall Nature Preserve**

| Taxa | Phylum | B-1 | B-2 | B-3 | B-4 | B-5 | B-6 | B-7 | B-8 | B-9 | B-10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Tubificoid Naididae spp.* | Annelida | 20 |  | 212 | 1 |  |  |  |  |  |  |
| *Limnodriloidinae spp.* | Annelida | 1 |  |  |  |  |  |  |  |  |  |
| *Limnodrilus hoffmeisteri* | Annelida |  |  | 3 |  |  |  |  |  |  |  |
| *Naidinae spp.* | Annelida |  | 1 |  |  |  |  | 5 | 6 |  | 2 |
| *Pristina nr. plumaseta* | Annelida |  |  | 4 | 6 |  |  |  |  |  | 1 |
| *Dero furcata* | Annelida |  |  |  |  |  |  |  | 1 |  |  |
| *Dero pectinata* | Annelida |  |  |  |  | 1 | 19 | 19 | 12 | 1 | 28 |
| *Dero nr. obtusa* | Annelida |  |  |  |  |  |  | 1 | 6 |  |  |
| *Haitia cubensis* | Mollusca |  | 4 |  |  |  |  |  |  |  |  |
| *Pyrgophorus platyrachis* | Mollusca | 4 |  |  |  | 4 |  | 7 | 3 |  | 3 |
| *Melanoides tuberculatus* | Mollusca |  |  |  | 1 |  |  |  |  |  |  |
| *Planorbidae spp.* | Mollusca |  | 1 |  |  |  |  |  |  |  |  |
| *Talitridae spp.* | Arthropoda |  |  | 1 |  |  |  |  |  |  |  |
| *Hyalella spp.* | Arthropoda |  |  |  | 12 |  |  |  |  |  |  |
| *Chironomidae spp.* | Arthropoda |  |  |  |  |  | 1 | 9 | 1 |  | 1 |
| *Chironomus spp.* | Arthropoda |  |  |  | 4 | 8 | 35 | 203 | 63 | 33 | 25 |
| *Goeldichironomus spp.* | Arthropoda |  | 1 | 3 |  |  |  |  |  |  |  |

Table and species analysis provided by Terra Environmental Services, Inc. St. Petersburg, Florida, USA

## Discussion:

In hydroperiod and water salinity, the Sanctuary mangrove wetland and lake are identical to isolated freshwater wetlands. Freshwater plants found in Sanctuary ponds and in the adjacent Government-owned wetlands were growing in water salinities only 1 ppt lower than the salinity found in the lake. The lake is shallow enough to support the growth of emergent freshwater plants, but the large number of herbivorous tilapia may be preventing this. All of the benthic saltwater macroinvertebrates have been replaced by freshwater species; in time, the same may be expected of the plants as well. Water salinities at all wetland sample stations were below the brackish water salinities required by mangroves to maintain their dominance against freshwater plants in the long term.

This transformation to a freshwater wetland threatens the very survival of a mangrove community that provides all-important habitat for Barbados' wading birds and waterfowl, of which 37 species were identified during the assessment period, including 16 migratory species. A restoration of regular, if not daily, tidal fluctuations within the Sanctuary mangrove ecosystem would begin to restore its estuarine condition. Without reconnection to the sea, the eventual loss of the Sanctuary's mangrove ecosystem, including its wading bird community, can be expected.

The conversion from a brackish mangrove wetland to a freshwater wetland in which freshwater plants replace mangroves may take a long time; nonetheless, it could be accelerated by a major perturbation, which may be inevitable. If left unchecked, such a change at Graeme Hall Nature Sanctuary may permanently eliminate its mangrove ecosystem and the wading bird and waterfowl community it supports, hallmarks of this internationally recognized site.

Several issues related to the restoration of daily tidal fluctuations within the Sanctuary mangrove ecosystem bear further study and remain unresolved. Could the algal collars that inhabit mangrove roots in an intertidal zone but that were not found be (re)established? Could the spotted mangrove tree crab (*Goniopsis cruentata*) and mangrove periwinkle snail (*Littorina angulifera*) that associate with these algal collars that were not found be (re)introduced? Is the herbivorous tilapia (*Oreochromis mossambicus*) that appeared to be abundant in the lake preventing the growth of vascular plants there? Would the tarpon *(Megalops atlanticus*) that for years have been confined to the lake benefit from a seawater reconnection? Why did the number of fiddler crabs (*Uca bergersi*) and blue land crabs (*Cardisoma guanhumi*) appear to be so low? If the seawater connection was re-established, would the nearshore fishery and coral reef benefit from the detritus and nutrients from the mangrove ecosystem? Would the mangrove ecosystem serve as a nursery for the near shore fishery? How pervasive and invasive are volunteer freshwater plant species found in the Sanctuary, and in some cases within the white mangrove forest, such as clammy cherry (*Cordia obliqua*)? What local freshwater plants might invade openings in the mangrove canopy created by perturbation(s) such as hurricanes and or fires which were occurring due to the severe drought in near proximity to the Sanctuary during February 2010 (Figure 3)?

Figure 3. Smoke hangs over egret islands from nearby fires February 2010

(Photo by Richard Pryor)

**References:**

Simberloff, DS. 1983. Mangroves. *In*: Janzen, DH., ed. *Costa Rican Natural History.* 273-276. University of Chicago Press. Chicago, IL.

Tomlinson, PB. 1986. *The botany of mangroves*. Cambridge University Press. London.)

Wallace, R. and R. Pryor, *Wetland Ecosystem Assessment for Graeme Hall Nature Sanctuary*, Environmental Engineering Consultants, Inc., Tampa, Florida, 2010

# Part II

Part II describes the quality of the mangrove ecosystem within the Graeme Hall Nature Sanctuary (Sanctuary) as found February 8-13, 2010. Most notably, its saltwater ecology was being and had been in part replaced by a freshwater ecology due to the absence of seawater inputs since August 2006 and irregular and infrequent inputs before that.

## Background

Daily tidal cycles have been absent in the Sanctuary mangrove ecosystem possibly for decades or even longer following its steady disconnection from the sea starting in the 1700's due to construction, channelization, sluice gate control and finally permanent closure of the sluice gate in 2006. Upon commencement of this field study, a drought was and had been in effect that had depressed the water levels well below what is normal for a mangrove ecosystem. The current wetland water supply was totally dependent on electrical pumps and staff to operate them and water levels had improved only slightly before the end of the study. Given that the Sanctuary was closed for business in December 2009 staff, electricity and wetland water supply should not be taken for granted.

A coral reef formed in the nearshore waters in front of the mangrove wetland well before the alterations that began in the 1700's. Coral reefs commonly form in close proximity to mangrove esturaries due to their mutually beneficial relationship. In such an ecosystem relationship, natural exchange of the mangrove lagoon and the coral reef would be mutually beneficial. The mangrove community would provide nutrients to reef fishes. Fishes from the reef and sea would use the mangrove estuary to reproduce juveniles that would feed and be protected amongst the mangroves. Upon maturity, these would venture into the sea to the reef and beyond.

The 12 acre lake within the Sanctuary that was carved from the mangrove forest is an integral part of the mangrove forest ecosystem since this appears to be where most of the biogeochemical cycling occurs.

## Ecosystem boundary

An ecosystem is the interaction of living (biological) components with non-living components within a scaled boundary as well as energy, materials and in this case organisms across that boundary. The parent document to this report dealt with the nonliving components, i.e., water and sediment quality. This following report addresses the biological changes in the Sanctuary's mangrove ecosystem that are related to a freshwater transformation. Data from the parent document are used as indicators of this freshwater transformation such as salinity measurements and benthic community analysis. Setting an ecosystem boundary is arbitrary since boundaries of larger and smaller sizes and scales can be created.

For purposes of this report, an ecosystem boundary was created around the Sanctuary's mangrove-lake. Historically, water flowed across this ecosystem boundary in both directions when the sluice gate was regularly opened to the sea. For about the last 3.5 years only freshwater has entered the mangrove-lake ecosystem and has normally departed via evaporation and evapotranspiration. Organic wastes enter the mangrove-lake ecosystem via drainage basin runoff and or are generated from within the lake by fish. Some of the organic wastes are converted to nutrients and biomass via biogeochemical cycles; the degree of conversion was not measured in this study. In a normal mangrove wetland, some of the generated biomass and nutrients flow out to sea with tides which is commonly known throughout the world to be beneficial to nearshore fisheries and coral reefs. Wastes other than organic matter enter the ecosystem boundary as well such as organophate pesticides for which no comparable biogeochemical cycling is readily available and which may be lethal depending on the concentration.

Humans play a role in each of these boundaries.

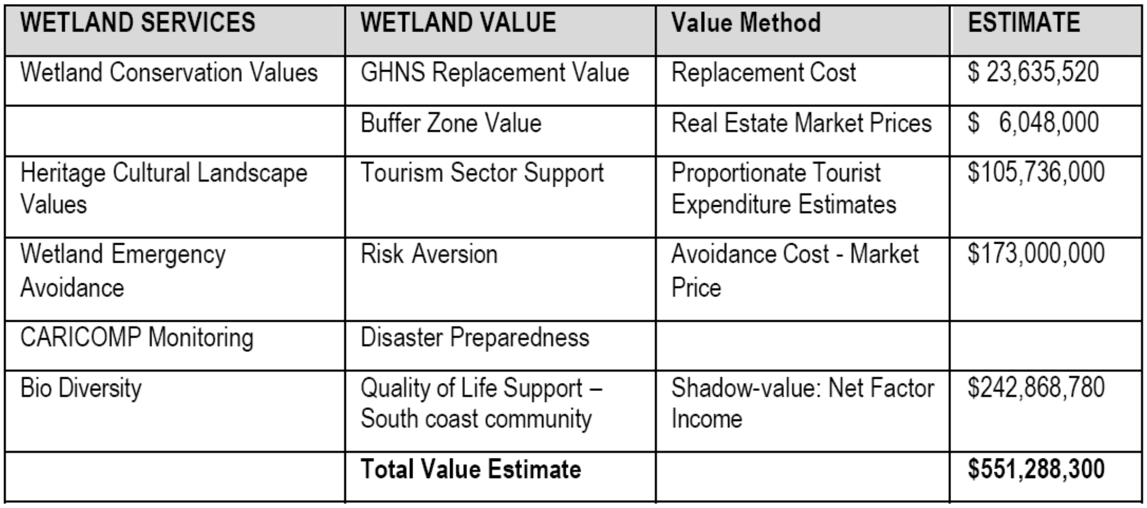
- A smaller window around just the lake, which was carved from the mangrove forest which includes the biogeochemical cycling occurring in the benthos.
- A larger window that includes the above domain and adds the fresh and so called "brackish" open water pond, lily ponds and ditches internal to the Sanctuary.
- A bigger window around that and the seaward bisecting canal and the government-owned freshwater marsh and mangrove.
- An even larger window that includes those and the drainage basin and the ditches from the commercial district.

- A much larger window that includes all of the above as well as the coral reef off Worthing Beach in front of the sluice gate.
- Finally, these ecosystem system boundaries connect to the Barbadians and the world at large mainly via information and image. Graeme Hall history dates back to the 1600's and culminates with the images and education that were provided to school children, tourists and even via marriage ceremonies that were conducted at the Sanctuary. Information and image reached the global scale at the point that the Graeme Hall wetland became a RAMSAR wetland and at the point where tourists were attracted to visit.

## Valuation

Mangrove ecosystems provide important functions and values, and contribute a significant and important amount of work not only to the region but the nation of Barbados as well. During this era of seeking alternative energy sources, wetlands and ecosystems in general are gaining recognition as being the most efficient solar energy biomass converters on the planet, and mangrove ecosystems are recognized among the best if not the best. Mangrove wetlands are very effective at converting wastes into minerals and into nutrients for biomass production. They provide nursery grounds and breeding sites for various species including birds, fish, crustaceans, reptiles, and mammals (Alongi, 2002). They provide nutrients to nearshore fisheries and coral reefs. Mangroves have been shown to act as a vegetative buffer zone between disturbed freshwater sources and coastal water (Lin, 2004).

In 2008, the Macro-Economist Dr. Allan N. Williams valued the Graeme Hall wetlands at over $1.1 billion Barbadian or over $550 million US. William’s table reference to GHNS stands for Graeme Hall Nature Sanctuary and CARICOMP for Caribbean Coast Marine Productivity Program.



| WETLAND SERVICES | WETLAND VALUE | Value Method | ESTIMATE |
|---|---|---|---|
| Wetland Conservation Values | GHNS Replacement Value | Replacement Cost | $ 23,635,520 |
|  | Buffer Zone Value | Real Estate Market Prices | $ 6,048,000 |
| Heritage Cultural Landscape Values | Tourism Sector Support | Proportionate Tourist Expenditure Estimates | $105,736,000 |
| Wetland Emergency Avoidance | Risk Aversion | Avoidance Cost - Market Price | $173,000,000 |
| CARICOMP Monitoring | Disaster Preparedness |  |  |
| Bio Diversity | Quality of Life Support – South coast community | Shadow-value: Net Factor Income | $242,868,780 |
|  | **Total Value Estimate** |  | **$551,288,300** |

Unlike the market table above that appears to be based on market value, there is a method that determine the amount of work an ecosystem contributes to the Gross Domestic Product of a nation (Odum, Howard T., 1996.) Little if any consideration has been given to the value of the work that wetlands provide. Historically, wetlands have been considered worthless and something to be “improved.”

**Wetland characterizations**

Mangrove swamps are intertidal wetlands that support salt tolerant flora and fauna. Swamps are wetlands dominated by wetland trees, and marshes are wetlands dominated by wetland herbs. In 2006, Ramsar designated the Graeme Hall wetland as a mangrove “forest” which was in accordance with their wetland classification system. The term “swamp” is part of the Canadian wetland classification system (Mitsch, W.J. and J.G. Gosselink, 2000) a term that is widely used in the United States. Hereafter, “forest” will be used in lieu of “swamp,” and “mangrove” may be used in lieu of “mangrove forest.” Mangrove, mangrove wetland, mangrove forest and mangrove swamp are synonymous.

In 2006, RAMSAR used the phraseology “mangrove forest” when they added the Graeme Hall wetland that includes the Sanctuary to their protection list. Mangrove,

mangrove forest, mangrove swamp and mangrove wetland are synonymous for purposes of this report.

By definition, mangrove wetlands inhabit brackish water and dominate the area between the highest and lowest tides, i.e., the intertidal zone. One way to classify mangrove wetlands is by their position along a salinity gradient; with salinity decreasing the closer the mangroves get to their freshwater source, such as when they begin to move into rivers from estuaries. By definition, an estuary is an embayment where freshwater and saltwater mixing results in brackish water with salinities of 6-30 ppt. This is the expected range of salinity for a healthy mangrove ecosystem that supports saltwater flora and fauna. The average salinity in the Sanctuary’s mangrove-lake ecosystem was currently found to be 1.9 ppt, which is considered freshwater. Mangroves survive well in freshwater but mangrove forests don’t emerge there due to freshwater plant competition.

**Classical wetland definition**: Wetlands have classical and contemporary definitions. Classically, three parameters must be met to qualify as a wetland: a wetland hydroperiod (defined below), wetland or hydrophytic (water-loving) plants, and wetland soils. Mangroves are hydrophytic as well as halophytic (saltwater and freshwater-loving).

**Contemporary wetland definition:** The contemporary definition of a wetland only requires the presence of a wetland hydroperiod and a dominance of wetland plants, and lacks the wetland soil requirement. This definition arose from development and wetland destruction. Before the advent of wetland protection, wetlands were filled which often led to inundation and or saturation in upland or transitional soils that hitherto had supported only upland or transitional vegetation but that subsequently supported wetland vegetation. Hence wetlands began to develop in the new low spots in the drainage basin in upland soils instead of wetland soils. Also, the contemporary definition of a wetland applies to “wetland mitigation areas” i.e. manmade wetlands created in upland soils that were excavated deep enough to form a wetland hydroperiod.

**Hydroperiod definition:** Wetlands are areas that are regularly and periodically inundated or saturated even if only for relatively brief periods. Hydroperiod is the word often used to describe the normal depth to which water pools, which is sometimes synonymous with the seasonal high water level. Technically, however, it includes the length of time of inundation since biological indicators of hydroperiod take time to develop. For instance, the algal collars that normally grow on red mangrove roots do so in the intertidal zone, which is the vertical zone between high tide and low tide.

**Sluice gate:**

The sluice gate sits at the head of the narrow "bisecting" canal on Worthing Beach on St. Lawrence lagoon in the Caribbean, and has been non-operational since August 2006.

(Photo by Angelo Tulimieri)

Noteworthy was the observation that the tide was lapping at the foot of the sluice gate during the inspection. Given that there appeared to be less than a meter difference in height between surface of the beach sand on the beach side of the sluice gate and the surfacewater in the canal, it was evident that water could have flowed into the canal without discharging back over the beach.

Caribbean lapping at sluice gate

(Photos by Richard Pryor)

**Wetlands vs. Surfacewaters**: Whereas wetlands are surfacewaters not all surfacewaters are wetlands i.e. the absence of wetland vegetation. The surfacewaters associated with the Sanctuary include the "Sanctuary bisecting" canal, four (4) wetlands (five (5) if you include the canal), four (4) open water bodies devoid of vegetation, ditches inside and outside the Sanctuary, and the greater drainage basin at large that includes urban and agricultural runoff. A ditch drains from the Highway-7 commercial district into the Sanctuary's internal ditches during high-water overflow periods. There are subsurface connections as well that include the groundwater table that appears in the laks as surfacewater and there is spring water that is pumped into the ponds that appear as surfacewaters. There are reports of direct spring water connections but this is unverified for purposes of this report.

**Non-wetland surfacewaters:** The four (4) open surfacewater bodies that are not wetlands include the 12 acre lake and its small pond to the south connected at two points that are both surrounded by mangroves, and two temporal open water ponds or "trays," one so called "brackish" and the other fresh. The name "brackish" tray was applied before the termination of seawater inputs and this appears to be supported solely by freshwater as well. None of these open water bodies qualified as wetlands since they were not dominated by wetland plants during the February 2010 field study. A very small number of plants were found growing in both trays but these provided about a tenth of one percent (0.01%) or less coverage.

**Wetland descriptions:** The Graeme Hall RAMSAR wetlands are divided between those located within the Sanctuary and those located on government owned land.

The wetlands within the Sanctuary include the mangrove forest associated with the manmade lake and two waterlily ponds. The wetlands on the government land include mangrove forest, spikerush marsh and the "bisecting" canal.

**Mangrove forest – Sanctuary:** This wetland is dominated by red mangroves (*Rhizophora mangle*) and sub-dominated by white mangroves (*Laguncularia racemosa*). Black mangrove (*Avicennia germinans*) was not found and has never been reported to be found in Graeme Hall. The red and white mangroves were found in textbook zonation patterns with the red mangroves positioned at the lower, wetter elevations and the white mangroves located in the high drier locations above the red mangroves. In terms of heights, the white mangroves tended to dominate at 20-30 meters in height. However, mangrove roots appeared to be hanging behind and well above the red mangroves that lined the lake: if so, then some these may have been as much as 20 m or more height. Around the edge of the lake, red mangroves appeared to reach about 10 m or more in height.

Classification: Mangrove ecosystems are classified in textbooks on their position in the landscape, which affects salinity and hydroperiod, and tree heights. However, no corollary to the Graeme Hall mangrove forests was found and it may be considered an extreme outlier, statistically, with no comparisons. Research indicates that it formed as a fringing wetland but as its connection to the sea gradually diminished it acquired some "basin" characteristics in which the sea connection narrower than in an estuary.

**<u>Hydroperiod</u>:** The hydroperiod is no longer self-sustaining due to the elimination of the daily tidal cycles. Therefore, the hydroperiod is identical to an isolated freshwater wetland. That is, the changes in water levels occur very slowly and irregularly compared to daily tides and they can fall well below what would be the intertidal zone or low tide or mean low tide. In some areas, white mangrove pneumataphores were found indicating some degree of regular inundation historically.

Due to the drought that was and had been in effect for a prolonged period, the water levels were lower in the main lake than the recent normal water level marked by the stain line. Water levels had dropped below ground in the freshwater tray in the southwest corner; and almost completely below ground in the so called "brackish" tray on the west side. These shallow ponds for the most part have bottom elevations significantly if not substantially higher than bottom of the main lake.

<u>Plant associates</u>: Buttonwood (*Conocarpus erecta*) was located in the more elevated parts of the white mangrove forest but provided less than 5% coverage overall. Bearded fig (*Ficus citrifolia*) trees were found associating with white mangroves in areas that were dry or moist and seedling were found in some moist soils as well which is consistent with their wetness rating as a transitional species. Clammy cherry (Cordia obliqua) was scattered around the edges of the white mangrove part of the forest and is cases within it.

**Mangrove islands – Sanctuary:** There are two small red mangrove islands in the 12 acre lake that are and have been in constant use by egrets. There are also two "overwash" like mangrove islands in the so called "brackish" water tray.

**Wetland ponds – Sanctuary:** These wetlands were dominated by waterlily (*Nymphaea* spp.) and will be referred to as "lily ponds." By definition, marshes are less than 3-meters in depth since this is the maximum depth that plants can root, i.e. waterlily.

**"Bisesting" canal – Sanctuary:** This canal has a relatively small cross-sectional dimension. The Government's mangrove forest would join the Sanctuary's mangrove forest if not for the canal that separates the two on the north side. The canal crosses under Highway-7 and stopped a few meters short of reaching the sluice-gate.

> Vegetation: The "bisecting" canal north of Highway-7 had a significant population of arrowhead (*Sagittaria lancifolia*) and waterlily (*Nymphaea*) freshwater herbs. The canal south of Highway-7 was devoid of vegetation.

**Mangrove forest – Government-owned**: This is a mangrove forest surrounded by a freshwater marsh that is dominated by freshwater herbs. Also there were scattered patches of red mangrove that were surrounded and in some case interspersed with marsh herbs.

**Marsh – Government-owned:** This freshwater marsh was essentially a monoculture of herbal spikerush (*Eleocharis mutata*) which is in the sedge family (Cyperaceae) during this field study provided complete ground coverage outside the mangroves.

**Intertidal zone:** In a healthy intertidal mangrove forest, algal collars grow on the mangrove roots between high and low tides, i.e. the intertidal zone. These algal collars are composed of fungus and chlorophyte filaments. Small algal collars were found but only on a few red mangrove roots in the Sanctuary and bisecting canal. These appeared to be surviving by wicking water instead of by daily tidal inundation. The fungus and chlorophyte components of the algal collars were not identified. A variety of fauna associate with these

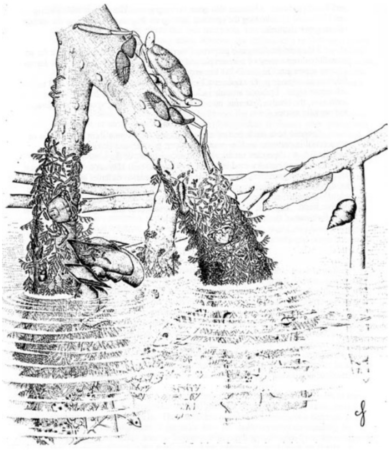


Figure D- 1. The intertidal zone on *Rhizophora mangle* prop roots provides substrate for a characteristic assemblage of marine algae.

In a healthy mangrove forest these algal collars may be expected to develop and for a small number of fauna to associate with them. These fauna can include the spotted mangrove tree crabs (*Goniopsis cruentata*) and mangrove periwinkle (*Littorina angulifera*) which is a snail. They can become an important part of the food chain. Neither species was found during the monitoring event. Chenery reported that he had never seen them in the Sanctuary. If daily tidal fluctuations were re-established then (re)introducing this species and its associates should be investigated in order to increase diversity and enhance the food chain.

The spotted mangrove tree crab is a macrodetrtivore and feeds on fallen mangrove leaves (Raulerson, 2004). It is commonly found associating with algal collars that grow on mangrove roots within the intertidal zone. *Goniopsis cruentata* has been found in Barbados but none were located in the Sanctuary during the current monitoring report. This species of crab is a favorite in the Ibis diet.

**Invertebrate identification:** Several termite (*Isoptera*) nests were found both on the ground and in tree crotches. The number of blue land crabs (*Cardisoma guanhumi*) and fiddler crabs (*Uca bergersi*) appeared to be low.

Blue land crabs (*Cardisoma guanhumi*) inhabit the upper parts of the mangrove forest in the white mangrove zone as well as the upper red mangrove zone. A substantial number of blue land crab burrows were either abandoned or plugged but an equal or greater number of active burrows was located and their density or number of holes per area appeared to be high.

A small number of fiddler crabs (*Uca bergersi*) and their burrows were found during the monitoring period. A comment in a historic newletter mentioned that fiddler crab were so abundant (at that time) that they were swarming over the Sanctuary sidewalks. Reports, including by Ryan Chenery, indicate that fiddler crabs and blue land crabs were far fewer in number during the current monitoring event than historically. Fiddler crabs are reportedly are susceptible to insecticides and massive malathion fogging has been reported within the government's wetlands. Malathion is an organophosphate and has been claimed to be toxic to fish species as well. The potentially toxic effects of malathion merit additional research if not testing.

**Vertebrate identification:** During the week of February 8-13, 2010, Ryan Chenery, the Chief Naturalist for Graeme Hall Nature Sanctuary before it closed, identified 37 bird species (Attachment 12). Chenery also identified two mongoose (*Herpestidae*). Also spotted were several green monkeys (*Chlorocebus*) individually and in groups as well as dozens of tilapia (*Oreochromis mossambicus*) and Atlantic tarpon (*Megalops atlanticus*).

Glossy ibis (*Plegadis falcinellus*) is a wading bird that was identified in the Sanctuary during the current monitoring period. One study of Ibis spp. in a Brazilian mangrove forests found that this ibis fed mostly on fiddler crabs (*Uca* spp.) taken directly from their burrows (Olmos, et. al., 2001). *Plegadis* is a tactile forager with a long curved beak adapted to probing inside fiddler crab burrows.

**Summary:** The mangrove wetland appears to have become a freshwater wetland based on freshwater benthic community that was discovered in the Sanctuary's lake via sampling and species indemnification. As such, the mangrove forest is in definite danger of being replaced by a freshwater ecology that is less complex and of less value than in terms of ecosystem functions and services, possibly more so to the avian community.

Other indicators of freshwater transformation were found. The "bisecting" or bifurcating canal that cuts through the major portion of the mangroves is supporting freshwater plant species. The salinity of the soil sediments there and in the 12-acre lake that was carved from the mangrove forest, were nearly the same which may mean that the soils in the mangrove forest may support freshwater species. (Sodium ion concentration in the sediments was used as a substitute for salinity that inadvertently was not analyzed – sodium is just one of the ions that form salinity.) Additionally, on government owned land, mangroves are surrounded and in some cases interspersed with freshwater herbs. Lake water freshening was found as well.

Mangroves show excellent growth in freshwater but lose the competitive advantage that they enjoy in saltwater and brackish water; and this is their vulnerability. If they lose that, then any perturbation to the mangrove canopy, such as lightning or hurricane, may kill mangroves and may create an opening or openings in the mangrove canopy for opportunistic plant species to invade.

One such species may be clammy cherry (*Cordia obliqua*) which was found in and around parts of the mangrove forest. Literature on clammy cherry appears to be extremely sparse and no information was found as to whether it is a transitional species or a wetland species. If it were salt tolerant then it should be commonly referenced as an associate of white mangroves (*Laguncularia racemosa*) as is buttonwood (*Conocarpus erecta*) but no such reference was found. Its presence in the mangrove forest may indicate that at the very least it is a transitional species. What information was found indicates that clammy cherry is a shrub capable of reaching heights of 7-8 meters and of providing significant canopy coverage. If clammy cherry were to become established in any gaps that might form in the mangrove, then ground beneath may provide recruitment sites for freshwater species including trees that might outcompete and eventually eliminate the mangroves. Bearded fig (*Ficus citrifolia*), which is a tall tree with a wide canopy, was found inhabiting elevations comparable or slightly higher than nearby white mangroves.

The mangroves are relying on freshwater for their survival in the absence since August'06 of daily tidal fluctuations. Consequently, water levels change very slowly in the lake and mangrove forest instead of with daily fluctuations between low tide and high tide. Tidal fluctuations should occur if the mangrove was (re)connected to the sea albeit that the fluctuation would be delayed due to the dimensional restrictions of the bisecting (connecting) canal.

Currently, the mangrove hydroperiod is identical to that of a freshwater wetland in that it depends on freshwater inputs from surface and ground water. During the field investigation in February'10, the water level was low in the lake and almost if not completely absent from the freshwater tray and the so called "brackish" water tray. After the first two to three days of pumping spring water, the freshwater tray was full of water and the water level in the lake was higher by a few centimeters as well. Nonetheless, a significant amount of white mangrove soil was dry at least at the surface where hundreds of blue land crab burrows had been abandoned. Regular soil dehydration may provide more opportunities for transitional plant species to recruit.

Crabs were missing and/or few in number during the field investigation. spotted mangrove tree crabs (*Goniopsis cruentata*) were not located. This crab lives on the trees and associates with the algal collars that grow in the intertidal zone (the area between high and low tide). Such algal collars were found in small sizes and only on a relatively few red mangrove roots, and appeared to be surviving by wicking water instead of by daily tidal inundation. Under normal conditions, a number of fauna associate with these algal collars and their absence eliminates an important part of the mangrove food chain. If daily tidal fluctuations are re-established then (re)introducing this species and its associates should be investigated in order to increase diversity and enhance the food chain.

Fiddler crabs (*Uca bergersi*) and blue land crabs (*Cardisoma guanhumi*) were far fewer in number according to authoritative oral histories. Reportedly, massive numbers of fiddler crabs had swarmed parts of the Sanctuary historically whereas during the current field investigation, very few were seen and only a very small number of burrows were located.

Fewer blue land crabs were present than reported historically according to the Sanctuary's former Chief Naturalist, Ryan Chenery (Attachment 12). Historically, crabs were reported to be filling the ditch(es) in the Sanctuary yet only three were captured autopsy by an expert trapper even though six were scheduled for autopsy.

It was not determined what was responsible for the decline in numbers fiddlers and blue land crabs whether it be by predation; the low water levels due to drought and dehydration; the freshening of the water supply; some past lethal pesticide event, and or some other factor.

Thirty seven species of birds were identified from February 8-13, 2010 (Attachment 12). No assessment was attempted to estimate the size of the bird population or degree of nesting activity since this was a very sensitive period for such activity. Egrets on the two small mangroves in the lake were still very active. Some of the lower mangrove branches were dead or dying on the two small egret islands in the Sanctuary lake. Reportedly attempts to replant these islands have not been very successful. Mangroves are known for their island build function, which they can do only in the presence of daily tidal fluctuations. It may be that the islands are subsiding. The loss of these two islands would be very detrimental to the egrets since the islands provide a much higher degree of safety from local predators such as mongoose and the green monkey.

## References

Algal collar graphic copied without permission from paper by Christopher E. Tanner, Ilka C. Feller, and Aaron M. Ellison Biodiversity in the Mangrove Intertidal and Subtidal: Algal and Seagrass Communities. Found in Mangrove Ecology Workshop Manual edited by Ilka C. Feller and Marsha Sitnik

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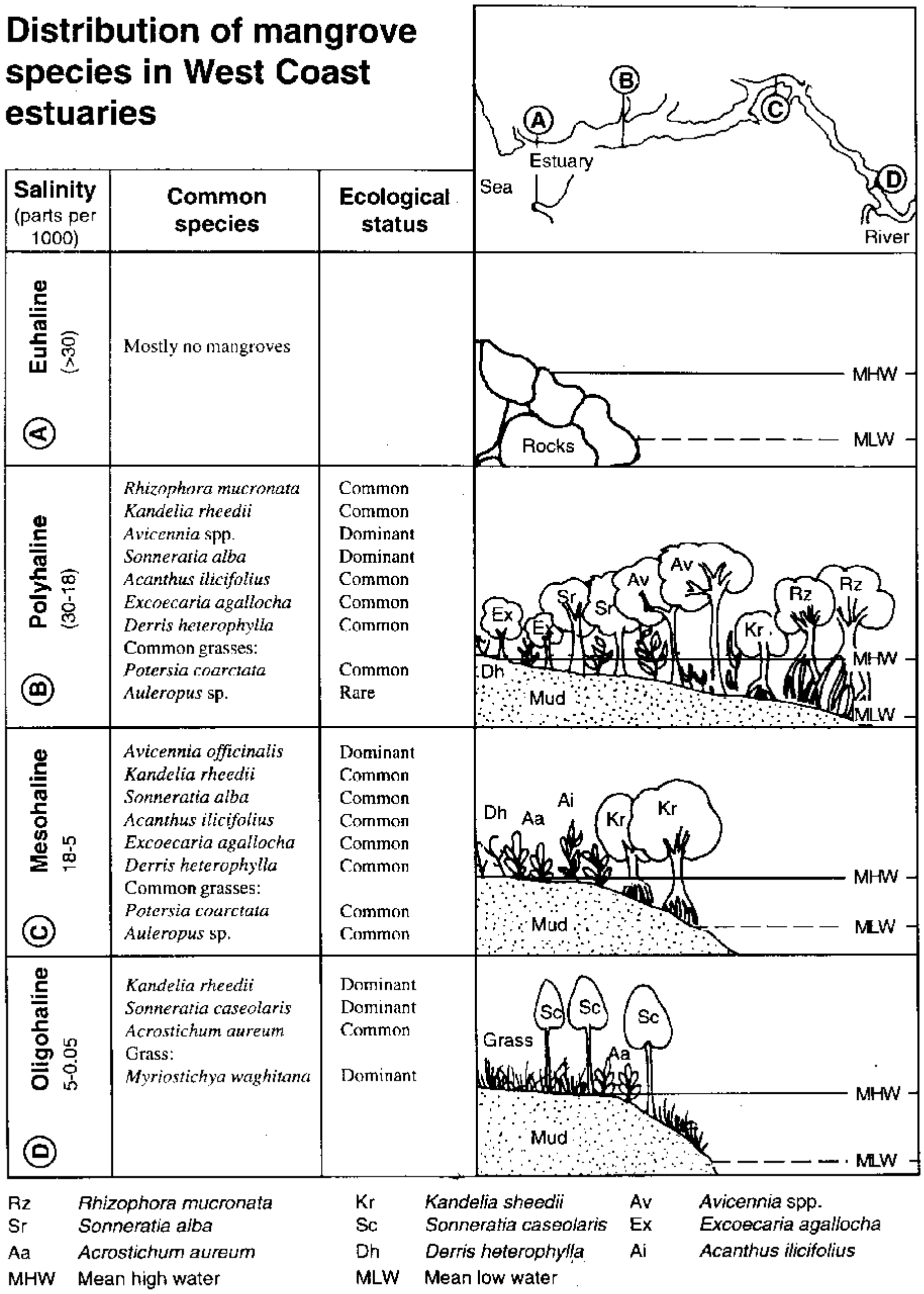
### Graphic: Mangrove communities

Note that red mangrove (*Rhizophora*) does not appear until 18-ppt in New Zealand estuaries.



**Distribution of mangrove species in West Coast estuaries**

| Salinity (parts per 1000) | Common species | Ecological status |
|---|---|---|
| Ⓐ **Euhaline** (>30) | Mostly no mangroves | |
| Ⓑ **Polyhaline** (30-18) | *Rhizophora mucronata*<br>*Kandelia rheedii*<br>*Avicennia* spp.<br>*Sonneratia alba*<br>*Acanthus ilicifolius*<br>*Excoecaria agallocha*<br>*Derris heterophylla*<br>Common grasses:<br>*Potersia coarctata*<br>*Auleropus* sp. | Common<br>Common<br>Dominant<br>Dominant<br>Common<br>Common<br>Common<br><br>Common<br>Rare |
| Ⓒ **Mesohaline** 18-5 | *Avicennia officinalis*<br>*Kandelia rheedii*<br>*Sonneratia alba*<br>*Acanthus ilicifolius*<br>*Excoecaria agallocha*<br>*Derris heterophylla*<br>Common grasses:<br>*Potersia coarctata*<br>*Auleropus* sp. | Dominant<br>Common<br>Common<br>Common<br>Common<br>Common<br><br>Common<br>Common |
| Ⓓ **Oligohaline** 5-0.05 | *Kandelia rheedii*<br>*Sonneratia caseolaris*<br>*Acrostichum aureum*<br>Grass:<br>*Myriostichya waghitana* | Dominant<br>Dominant<br>Common<br><br>Dominant |

| | | | | | |
|---|---|---|---|---|---|
| Rz | *Rhizophora mucronata* | Kr | *Kandelia sheedii* | Av | *Avicennia* spp. |
| Sr | *Sonneratia alba* | Sc | *Sonneratia caseolaris* | Ex | *Excoecaria agallocha* |
| Aa | *Acrostichum aureum* | Dh | *Derris heterophylla* | Ai | *Acanthus ilicifolius* |
| MHW | Mean high water | MLW | Mean low water | | |

Graphic used without permission (New Zealand Digital Library, The University of Walkato) http://nzdl.sadl.uleth.ca/cgi-bin/library?e=d-00000-00---off-0hdl--00-0----0-10-0---0---0direct-10---4-------0-11--11-en-50---20-about---00-0-1-00-0-0-11-1-0utfZz-8-00&a=d&c=hdl&cl=CL3.33&d=HASHd10071ff5b9a81a2180c80.4.3 -

# ATTACHMENT 12

Interview with Ryan Chenery
Chief Naturalist
Graeme Hall Nature Sanctuary

# Interview: Answers by Ryan Chenery, former Chief Naturalist for the Graeme Hall Nature Sanctuary; Questions by Angelo Tulimieri, Environmental Scientist

Q. Can you list the birds you saw outside the aviaries while I was there February 8-13, 2010?
A. (Bird identification by Ryan Chenery)

| **Common Name** | **Scientific name** | **Scientific name** | **Common Name** | **M*** |
|---|---|---|---|---|
| Anhinga | *Anhinga anhinga* | *Actitis macularia* | Spotted Sandpiper | * |
| Antillean Crested Hummingbird | *Orthorhyncus cristatus* | *Anas discors* | Blue-Winged Teal | * |
| Bananaquit | *Coereba flaveola* | *Anhinga anhinga* | Anhinga | * |
| Belted Kingfisher | *Ceryle alcyon* | *Ardea alba* | Great Egret | * |
| Black-Crowned Night-Heron | *Nycticorax nycticorax* | *Ardea Herodias* | Great Blue Heron | * |
| Black-faced Grassquit | *Tiaris bicolor* | *Bubulcus ibis* | Cattle Egret | |
| Blue-Winged Teal | *Anas discors* | *Butorides virescens* | Green Heron | |
| Carib Grackle | *Quiscalus lugubris* | *Cairina moschata* | Muscovy Duck | |
| Caribbean Coot | *Fulica caribaea* | *Calidris minutilla* | Least Sandpiper | * |
| Carribean Elaenia | *Elaenia martinica* | *Calidris pusilla* | Semipalmated Sandpiper | * |
| Cattle Egret | *Bubulcus ibis* | *Ceryle alcyon* | Belted Kingfisher | * |
| Common Ground-Dove | *Columbina passerina* | *Charadrius semipalmatus* | Semipalmated Plover | * |
| Common Moorhen | *Gallinula chloropus* | *Coereba flaveola* | Bananaquit | |
| Common Snipe | *Gallinago gallinago* | *Columba squamosa* | Scaly-naped Pigeon | |
| Glossy Ibis | *Plegadis falcinellus* | *Columbina passerina* | Common Ground-Dove | |
| Golden Warbler | *Dendroica petechia petechia* | *Dendroica petechia petechia* | Golden Warbler | |
| Gray Kingbird | *Tyrannus dominicensis* | *Egretta garzetta* | Little Egret | |
| Great Blue Heron | *Ardea Herodias* | *Egretta thula* | Snowy Egret | |
| Great Egret | *Ardea alba* | *Elaenia martinica* | Carribean Elaenia | |
| Greater Yellowlegs | *Tringa melanoleuca* | *Eulampis holosericeus* | Green-throated Carib | |
| Green Heron | *Butorides virescens* | *Fregata magnificens* | Magnificent Frigatebird | |
| Green-throated Carib | *Eulampis holosericeus* | *Fulica caribaea* | Caribbean Coot | |
| Least Sandpiper | *Calidris minutilla* | *Gallinago gallinago* | Common Snipe | * |
| Lesser Yellowlegs | *Tringa flavipes* | *Gallinula chloropus* | Common Moorhen | |
| Little Egret | *Egretta garzetta* | *Molothrus bonariensis* | Shiny Cowbird | |
| Magnificent Frigatebird | *Fregata magnificens* | *Nycticorax nycticorax* | Black-Crowned Night-Heron | |
| Muscovy Duck | *Cairina moschata* | *Orthorhyncus cristatus* | Antillean Crested Hummingbird | |
| Northern Waterthrush | *Seiurus noveboracensis* | *Pandion haliaetus* | Osprey | * |
| Osprey | *Pandion haliaetus* | *Plegadis falcinellus* | Glossy Ibis | * |
| Scaly-naped Pigeon | *Columba squamosa* | *Quiscalus lugubris* | Carib Grackle | |
| Semipalmated Plover | *Charadrius semipalmatus* | *Seiurus noveboracensis* | Northern Waterthrush | * |
| Semipalmated Sandpiper | *Calidris pusilla* | *Tiaris bicolor* | Black-faced Grassquit | |
| Shiny Cowbird | *Molothrus bonariensis* | *Tringa flavipes* | Lesser Yellowlegs | * |
| Snowy Egret | *Egretta thula* | *Tringa melanoleuca* | Greater Yellowlegs | * |
| Solitary Sandpiper | *Tringa solitaria* | *Tringa solitaria* | Solitary Sandpiper | * |
| Spotted Sandpiper | *Actitis macularia* | *Tyrannus dominicensis* | Gray Kingbird | |
| Zenaida Dove | *Zenaida aurita* | *Zenaida aurita* | Zenaida Dove | |

*Migratory

Q. What was your job title while at Graeme Hall Nature Sanctuary (Sanctuary)?
A. During my 5 years at the Sanctuary I was everything from Eco-Guide to Head of Eco-Guide Department to Operations Supervisor to Head of Water Management Department to Chief Naturalist to Head of Bird Care Department. I think Chief Naturalist is the most appropriate title.

Q. Are there any threatened or endangered birds on the list of birds that you observed during the week we worked together or that you've seen at the Sanctuary at other times?
A. .The subspecies of Golden Warbler (*Dendroica petechia petechia*) found at the Sanctuary is endemic to Barbados. It is classified as endangered… declining population due to habitat loss and brood parasitism by Shiny Cowbird. While there are sightings of Golden Warbler in other areas of Barbados (e.g. Chancery Lane), the largest population of this species is undoubtedly located at the Sanctuary. The area represents ideal habitat for this species.

Birds both on and off our bird list (above) seen at the Sanctuary which are endangered or threatened are the Red Knot (endangered), Caribbean Coot (threatened), and American Golden Plover (declining and threatened) The Red Knot and Plover were seen feeding in and around the fresh water tray a couple of years ago and I have seen Caribbean Coots feeding in the lake and behind the observation blind on many occasions in the five (5) years I was there and also while you were there during February 15-20, 2010.

Q. Can you comment on the rookery at the Sanctuary?
A. Cattle Egrets are the only species nesting in the rookery in the north east corner of the forest. For many years the Cattle Egrets would also roost in the mangroves along the lake. I witnessed the egrets gradually shift roost location from this site to an area deeper in the forest as years passed.

There are three species which nest on the two (2) small shrinking islands (Egret Island) in the lake. These are the Cattle Egret, Snowy Egret and Little Egret. The first record of Little Egret nesting in the western hemisphere was on Egret Island in 1994. They now also nest in Antigua. Therefore to date there are only two (2) places in the western hemisphere where little Egrets nest. Even seeing Little Egrets in the west is big news for birders, so that they are breeding is outstanding. I checked when I was on the kayak and yes all three (3) species are currently nesting on those two (2) Egret Islands. The Egret Islands are made up of both red and white mangrove however the rookery to the north east corner is only white mangroves.

Q. During your time at the Sanctuary what if any changes did you notice regarding the two Egret Islands including changes in island sizes, number of mangroves, types of mangroves, egret usage, etc?
A. In my time at the Sanctuary the Egret Islands have shrunk significantly in size. The islands are now about 2/3$^{rd}$ their original size. This shrinking nest area is a concern due to the fact that (as previously stated) it is one of only two (2) places in the western hemisphere where Little Egrets nest. The mangroves which make up the islands appear to be dying. There were previous efforts made to rehabilitate the islands. Young mangroves were planted in the sediment which had accumulated against the existing mangrove tree roots, also crocus bags were filled with soil and young red mangroves were planted in the bags, these were then placed on the existing islands. Dozens of trees were planted on the islands in this manner. However upon investigation

of the islands between Feb 15th and 20th 2010, it does not appear that any of the planted trees had survived.

Q. What is the other large fish species in the Sanctuary lake besides tilapia?
A. The large fish are Atlantic Tarpon *(Megalops atlanticus)* – one of the species that needs to get back to the ocean to breed but is locked in by the faulty sluice gate.

Q. Do you think the green monkeys (*Cercopithecus aethiops sabaeus*) and mongooses present a threat the birds in the Sanctuary?
A. Even though the islands are shrinking, they remain the safest location for the 3 species of egret to nest in the entire forest. As deep water permanently surrounds this nesting site it is an extremely effective natural barrier to attacks on nestlings and eggs by terrestrial predators such as Green Vervets and Indian mongoose. Monkeys can easily climb trees and raid nests but deep water is a definite deterrent to even the hungriest monkey. While people may say that any bird in a tree is safe from mongoose I have seen mongoose ascending tree trunks and limbs at 60 degree angles at the Sanctuary., I have even seen mongoose swimming across very shallow water in the fresh water tray, however I have never seen a mongoose attempt to reach the island by traversing the 6 ft deep waters of the main lake.

Q. Have you seen any changes to the floral or faunal communities, if so then what are/were they?
A. Regarding the changes in flora/faunal communities I'd say the biggest change was in the fiddler crab population. I know that these are widely regarded as bio-indicators of ecosystem health. From early 2009 I remember seeing a decrease in fiddler crab numbers. The University of the West Indies used to send students every year to collect about 30-40 fiddlers. They would always return them alive and well after studying them for about two (2) weeks. But when they came in 2009 it was very difficult to locate adequate numbers for their experiment. I know that there used to be at least four (4) areas at the Sanctuary with huge populations of fiddlers, when I left in December there was only one (behind the observation blind on the lakeside). Whether certain populations of fiddlers simply shifted locale en masse to other sites deeper into the forest I don't know, (maybe depleted food stocks of detritus?) but from 2004 to late 2008 there had always been healthy fiddler populations along the "boardwalk", along the banks of the fresh water tray, by the first bridge to start the boardwalk trek, and by the Observation Blind. Last December, only the Observation Blind had its population intact.

Q. Did you notice a change in blue land crab (*Cardisoma guanhumii*) populations since you left in December?
A. The number of crab holes did appear to be less during your visit and perhaps the crabs moved from certain areas due to drought, however I did notice something interesting in terms of blue land crab numbers that was quite disturbing and it was in an area where the water level was lower.

Let me explain: In my previous five (5) yrs at the Sanctuary I referred to the area behind the gully aviary (that's where the water in the canal was yellow during February 15-20, 2010) as "Crab Alley" because of the *huge* number of crabs that were always there. Any time you walked past there you were guaranteed to see dozens of crabs semi-submerged in the water, clinging to mangrove roots while feeding, and generally lounging around on the banks of the canal in or near holes. Even if land crabs were deep in their holes throughout the rest of Graeme Hall and people could not see a single land crab. One was sure to see land crabs of all ages and sizes in this area…but this was not the case during your time there. During February 15-20, 2010 the canal still had water - therefore I do not believe the drought could have instigated a mass exodus from this region as perhaps it did in other areas. At this time I can't explain why there were no crabs in Crab Alley.

Q. Are there any other comments you can make about the monkeys and mongooses that were and have been seen in the Sanctuary?
A. I have never seen green monkeys feed on any of the species of crabs found at the Sanctuary. However their numbers are increasing and it would not be difficult to envision these clever animals incorporating a new prey species into their diet. If we were to look at predation as a possible cause of crab deaths in crab alley I believe that mongoose may be a more likely culprit. Indian Mongoose is an introduced species to Barbados (as indeed is the Green Vervet) and their numbers at the Sanctuary have at times been extremely high. This has resulted in trapping programs, where the mongoose were caught and destroyed at the sanctuary. Mongooses are voracious little carnivores and can decimate populations of ground nesting birds and other land dwelling creatures quickly and efficiently. I have seen mongoose actively hunting and feeding on fiddler crabs at the Sanctuary. It is possible that they may also prey upon the larger blue land crabs. Add to this the fact that both the mongoose and monkey populations at the Sanctuary appeared to be increasing and one has cause to question their potential impact. I believe that mongoose numbers have once again reached heights where a trapping program may again need to be implemented in order to ensure that this introduced species does not wreak havoc on populations of resident and migratory species of fauna at the sanctuary.

Q. What did you see during your survey diving on the reef off Worthing Beach in front of the sluice gate?
A. There is still life out there. I saw two (2) Hawksbill turtles, two (2) Flounder, two (2) Chain Moray Eels, many species of Wrasse, and a variety of other small fish such as young surgeon fish and damsel fish. That said however, there is very little healthy coral left on that reef.
The main portion of the reef stretches parallel to the coast for about 300ft and there is a spit-like portion perpendicular to the coast that tapers to a point which is about 200ft from shore. There are large sand bars in the area surrounding the reef, and at times I could stand in ankle deep water and approach the reef in this manner, which was unique in my experience.

Q. Did you see or do you know of any seagrasses around the reef or anywhere in the St. Lawrence Bay?
A. There are no seagrass beds along any of the areas I checked including around the reef.

Q. Where can clammy cherry shrubs (*Cordia obliqua*) be found in the Sanctuary?
A. There are several large clammy cherry shrubs surrounding the lily ponds and if memory serves one growing on a small island in the middle of the larger of the two lily ponds. There are also many clammy cherry shrubs growing on the stretch of land between the lake and the pond located to the north of the observation blind. These two areas sustain the highest concentrations of this species. In both areas they grow side by side with white mangroves and in the area behind the blind there are also several red mangroves in the vicinity. They can be

found between the sidewalk and the lake. The primary disperser of the clammy cherry seeds is the Scaly-naped pigeon which are most common north of the observation blind.

Q. Do you remember ever seeing spotted mangrove crabs (*Goniopsis cruentata*) that live on the red mangrove trees and roots and that associates with the algae that are supposed to grow on the roots in the intertidal zone.
A. I've never seen any of those crabs at GHNS.

# ATTACHMENT 13

## Correlation of Sample Point Designations

# ATTACHMENT 13
# CORRELATION OF SURFACE WATER/ SEDIMENT SAMPLE POINT DESIGNATIONS

| 2001/2002 | 2010 | Location | Rationale for Sampling Point |
|---|---|---|---|
| **1A** | **S1A** | Fresh Water Pond | Previous sample location |
| **2A** | **n/a** | Fresh Water Pond | Only one of two locations in the eastern fresh water spring was sampled. |
| **2B** | **S2A** | Fresh Water Pond | Only one of two locations in the eastern fresh water spring was sampled. |
| **3A** | **n/a** | Brackish Tray | Brackish tray unsaturated |
| **3B** | **n/a** | Brackish Tray | Brackish tray unsaturated |
| **n/a** | **S3A** | West Side of Lake | Obtained near pump, that pumps water to Brackish tray |
| **n/a** | **S3B** | Southwest corner of Lake | Obtained at southwest corner of lake near inlet for water pumped to Brackish tray |
| **4A** | **n/a** | West Stormwater Ditch | Ditch unsaturated |
| **4B** | **S4B** | West Stormwater Ditch | Previous sample location |
| **4C** | **S4C** | West/ South SW Ditch | Previous sample location |
| **n/a** | **S4D** | South Stormwater Ditch | Obtained in the vicinity of murky, light green water |
| **4D** | **S4E** | South Stormwater Ditch | Fourth sample obtained from south swale/ ditch system |
| **n/a** | **S4F** | South SW Swale - Offsite | Fifth sample obtained from south swale/ ditch system, outside of property |
| **5A** | **S5A** | Freshwater Tray | Previous sample location |
| **5B** | **n/a** | Freshwater Tray | Freshwater tray unsaturated in this area |
| **6A** | **n/a** | South Pond att. to Lake | South pond unsaturated in this area |
| **6B** | **S6B** | South Pond att. to Lake | Previous sample location |
| **7A** | **S7A** | SE Corner of Lake | Previous sample location |
| **7B** | **S7B** | North Side of Lake | Previous sample location |
| **8** | **S8A*** | Bisecting Canal | Previous sample location |
| **9** | **n/a** | Eastern Spring | Northern parts of marsh unsaturated |
| **10** | **S10** | NE Corner of Lake | Previous sample location |
| **11** | **S11A** | Bisecting Canal | Previous sample location adjacent to emergency discharge outfall |
| **12** | **S9*** | East of GHNS | Previous sample location |
| **n/a** | **S12A** | Bisecting Canal | Obtained as intermediate location between 8A and 11A, north of south SW ditch discharge point |
| **n/a** | **S13** | East of GHNS | Obtained in close proximity to SCSTP |
| **n/a** | **S14** | East of GHNS | Obtained downstream of 13, between SCSTP and bisecting canal |

*** obtained further south than in 2001/2002**

# ATTACHMENT 14

## Laboratory Surface Water and Sediment Analytical Results

Test America, Inc.
Tampa, Florida

# ANALYTICAL REPORT

Job Number: 660-33863-1

Job Description: GHNS Barbados

For:
Environmental Engineering Consultant
5119 N. Florida Avenue
Tampa, FL 33603

Attention: Mr. Richard Pryor

Approved for release.
Nancy Robertson
Project Manager II
4/6/2010 11:43 AM

Nancy Robertson
Project Manager II
nancy.robertson@testamericainc.com
04/06/2010
Revision: 1

Methods: FDEP, DOH Certification #: TestAmerica Tampa E84282, TestAmerica Tallahassee E81005, TestAmerica Orlando E83012, TestAmerica Savannah E87052, TestAmerica Pensacola E81010

These test results meet all the requirements of NELAC unless specified in the case narrative. All questions regarding this test report should be directed to the TestAmerica Project Manager who signed this test report. The estimated uncertainty associated with these reported results is available upon request. The results contained in this test report relate only to these samples included herein.

ACCREDITED IN ACCORDANCE WITH nelac

## Job Narrative
## 660-33863-1

**Comments**
No additional comments.

**Receipt**
All samples were received in good condition within temperature requirements.

**8081A**
The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 660-90841 were outside of control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria. The data are flagged with J3 qualifiers.

**8151A**
The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 660-90805 were outside of control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria. The data are flagged with J3 qualifiers.

The matrix spike / matrix spike duplicate (MS/MSD) precision for batch 660-90805 was outside of control limits. Non-homogeneity of the sample matrix is suspected. The data are flagged with J3 qualifiers.

The surrogate recovery for the following samples was outside the upper control limit due to matrix co-elution: 660-33863-1, -2, -4, -4MS, -4MSD. This sample did not contain any target analytes; therefore, re-extraction and/or re-analysis was not performed. The data are flagged with J1and L qualifiers.

**8141A**
The laboratory control sample / laboratory control sample duplicate (LCS/LCSD) for batch 640-65758 were outside of control limits for dichlorvos and monochrotophos. The laboratorie's SOP allows for 3/20 analytes to recover outside of limits when a full analyte spike is run. The data are flagged with J3 qualifiers.

The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 640-65935 were outside of control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria. The data are flagged with J3 qualifiers.

**6010B**
The matrix spike / matrix spike duplicate (MS/MSD) recoveries for certain analytes for batch 660-90828 were outside of control limits. RPDs were within control limits The associated laboratory control sample (LCS) recovery met acceptance criteria. The data are flagged with J3 qualifiers.

The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 660-91263 were outside of control limits for analytes Mg and Ca. RPDs are within limits. The associated laboratory control sample (LCS) recovery met acceptance criteria. The data are flagged with J3 qualifiers.

**7471A**
The matrix spike duplicate (MSD) recovery for batch 660-91390 was outside of control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria. The data are flagged with J3 qualifiers.

**RSK-175**
The method blank (MB) for batch 400-104462 contained an i value for carbon dioxide. The samples contained greater than 10X the amount found in the method blank. The data are flagged with V qualifiers.

**SM 4500 H+B**
The samples were received outside of holding time for pH. The data are flagged with Q qualifiers.

**180.1**
Samples were received with greater than 50% of holding time expired. As such, the laboratory had insufficient time remaining to perform the analysis within holding time. The data are flagged with Q qualifiers.

**350.1**
The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 680-161811 were outside of control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria. The data are flagged with J3 qualifiers.

**353.2**
The samples were received with greater than 50% of holding time expired. As such, the laboratory had insufficient time remaining to perform the analysis within holding time. The data are flagged with Q qualifiers.

**SM 5210B**

The samples were received with greater than 50% of holding time expired.  As such, the laboratory had insufficient time remaining to perform the analysis within holding time.  The data are flagged with Q qualifiers.

**10200H**
The samples were received with greater than 50% of holding time expired.  As such, the laboratory had insufficient time remaining to perform the analysis within holding time.  The data are flagged with Q qualifiers.

**365.4**
The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 660-91269 were outside of control limits.  The associated laboratory control sample (LCS) recovery met acceptance criteria.  The data are flagged with J3 qualifiers.

The sample duplicate %RPD for batch 680-161565 were outside of control limits.  The associated laboratory control sample (LCS) recovery met acceptance criteria.  The data are flagged with J3 qualifiers.

**SM 5220D**
The matrix spike duplicate (MSD) recovery for batch 660-91132 was outside of control limits.  The associated laboratory control sample (LCS) recovery met acceptance criteria.  The data are flagged with J3 qualifiers.

**SM 4500 S2 F**
Insufficient sample volume was provided to perform matrix spike/matrix spike duplicate (MS/MSD) for batch 660-90918.

**SM 5550B**
The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 680-161223 were outside of control limits.  The associated laboratory control sample (LCS) recovery met acceptance criteria.  The data are flagged with J3 qualifiers.

**3510C/8081A**
Insufficient sample volume was provided to meet method-mandated requirements for matrix spike/matrix spike duplicate (MS/MSD) analyses for batch 660-90781.

**8151A**
Insufficient sample volume was provided to meet method-mandated requirements for matrix spike/matrix spike duplicate (MS/MSD) analyses for batch 660-90939.

# EXECUTIVE SUMMARY - Detections

Client: Environmental Engineering Consultant | Job Number: 660-33863-1

| Lab Sample ID<br>Analyte | Client Sample ID | Result | Qualifier | Reporting Limit | Units | Method |
|---|---|---|---|---|---|---|
| **660-33863-1** | **11A** | | | | | |
| Aluminum | | 1700 | | 20 | mg/Kg | 6010B |
| Arsenic | | 0.72 | | 0.49 | mg/Kg | 6010B |
| Boron | | 8.4 | | 4.9 | mg/Kg | 6010B |
| Barium | | 6.3 | | 0.98 | mg/Kg | 6010B |
| Calcium | | 82000 | | 490 | mg/Kg | 6010B |
| Cobalt | | 0.44 | I | 0.98 | mg/Kg | 6010B |
| Chromium | | 2.8 | | 0.98 | mg/Kg | 6010B |
| Copper | | 9.8 | | 2.0 | mg/Kg | 6010B |
| Iron | | 1400 | | 4.9 | mg/Kg | 6010B |
| Magnesium | | 2300 | | 49 | mg/Kg | 6010B |
| Manganese | | 28 | | 0.98 | mg/Kg | 6010B |
| Sodium | | 880 | | 49 | mg/Kg | 6010B |
| Lead | | 18 | | 0.49 | mg/Kg | 6010B |
| Strontium | | 1100 | | 9.8 | mg/Kg | 6010B |
| Titanium | | 30 | | 0.98 | mg/Kg | 6010B |
| Vanadium | | 3.2 | | 0.98 | mg/Kg | 6010B |
| Zinc | | 29 | | 2.0 | mg/Kg | 6010B |
| Mercury | | 0.024 | | 0.020 | mg/Kg | 7471A |
| Ammonia (as N) | | 18 | | 0.60 | mg/Kg | 350.1 |
| Phosphorus, Total | | 360 | | 18 | mg/Kg | 365.4 |
| Sulfide | | 29 | | 25 | mg/Kg | 9034 |
| Total Organic Carbon | | 38000 | | 3000 | mg/Kg | 9060 |
| Percent Solids | | 34 | | 0.10 | % | Moisture |
| ***Soluble*** | | | | | | |
| pH-Soluble | | 7.62 | Q | 1.00 | SU | 9045C |
| Orthophosphate-Soluble | | 1.4 | I | 3.0 | mg/L | SM 4500 P E |

# EXECUTIVE SUMMARY - Detections

Client: Environmental Engineering Consultant Job Number: 660-33863-1

| Lab Sample ID Client Sample ID<br>Analyte | Result / Qualifier | | Reporting Limit | Units | Method |
|---|---|---|---|---|---|
| **660-33863-2 13** | | | | | |
| Dieldrin | 1.0 | I | 1.7 | ug/Kg | 8081A |
| Aluminum | 4200 | | 19 | mg/Kg | 6010B |
| Arsenic | 0.57 | | 0.49 | mg/Kg | 6010B |
| Boron | 4.4 | I | 4.9 | mg/Kg | 6010B |
| Barium | 19 | | 0.97 | mg/Kg | 6010B |
| Calcium | 60000 | | 490 | mg/Kg | 6010B |
| Cadmium | 0.097 | I | 0.49 | mg/Kg | 6010B |
| Cobalt | 0.83 | I | 0.97 | mg/Kg | 6010B |
| Chromium | 4.2 | | 0.97 | mg/Kg | 6010B |
| Copper | 6.0 | | 1.9 | mg/Kg | 6010B |
| Iron | 2500 | | 4.9 | mg/Kg | 6010B |
| Magnesium | 2100 | | 49 | mg/Kg | 6010B |
| Manganese | 53 | | 0.97 | mg/Kg | 6010B |
| Sodium | 430 | | 49 | mg/Kg | 6010B |
| Lead | 5.4 | | 0.49 | mg/Kg | 6010B |
| Strontium | 3100 | | 39 | mg/Kg | 6010B |
| Titanium | 43 | | 0.97 | mg/Kg | 6010B |
| Vanadium | 6.4 | | 0.97 | mg/Kg | 6010B |
| Zinc | 21 | | 1.9 | mg/Kg | 6010B |
| Mercury | 0.023 | | 0.019 | mg/Kg | 7471A |
| Ammonia (as N) | 46 | | 3.0 | mg/Kg | 350.1 |
| Phosphorus, Total | 360 | | 21 | mg/Kg | 365.4 |
| Total Organic Carbon | 57000 | | 3000 | mg/Kg | 9060 |
| Percent Solids | 26 | | 0.10 | % | Moisture |
| ***Soluble*** | | | | | |
| pH-Soluble | 7.41 | Q | 1.00 | SU | 9045C |
| Orthophosphate-Soluble | 1.3 | I | 3.0 | mg/L | SM 4500 P E |

# EXECUTIVE SUMMARY - Detections

Client: Environmental Engineering Consultant | Job Number: 660-33863-1

| Lab Sample ID<br>Analyte | Client Sample ID | Result / Qualifier | | Reporting Limit | Units | Method |
|---|---|---|---|---|---|---|
| **660-33863-3** | **8A** | | | | | |
| Aluminum | | 410 | | 19 | mg/Kg | 6010B |
| Boron | | 11 | | 4.8 | mg/Kg | 6010B |
| Barium | | 2.0 | | 0.96 | mg/Kg | 6010B |
| Calcium | | 41000 | | 480 | mg/Kg | 6010B |
| Chromium | | 1.0 | | 0.96 | mg/Kg | 6010B |
| Copper | | 1.7 | I | 1.9 | mg/Kg | 6010B |
| Iron | | 280 | | 4.8 | mg/Kg | 6010B |
| Magnesium | | 1600 | | 48 | mg/Kg | 6010B |
| Manganese | | 6.0 | | 0.96 | mg/Kg | 6010B |
| Sodium | | 620 | | 48 | mg/Kg | 6010B |
| Lead | | 3.1 | | 0.48 | mg/Kg | 6010B |
| Strontium | | 630 | | 9.6 | mg/Kg | 6010B |
| Titanium | | 4.6 | | 0.96 | mg/Kg | 6010B |
| Vanadium | | 2.1 | | 0.96 | mg/Kg | 6010B |
| Zinc | | 3.9 | | 1.9 | mg/Kg | 6010B |
| Mercury | | 0.0093 | I | 0.019 | mg/Kg | 7471A |
| Ammonia (as N) | | 6.8 | | 0.30 | mg/Kg | 350.1 |
| Phosphorus, Total | | 160 | | 18 | mg/Kg | 365.4 |
| Total Organic Carbon | | 18000 | | 3000 | mg/Kg | 9060 |
| Percent Solids | | 32 | | 0.10 | % | Moisture |
| ***Soluble*** | | | | | | |
| pH-Soluble | | 7.56 | Q | 1.00 | SU | 9045C |

# EXECUTIVE SUMMARY - Detections

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

| Lab Sample ID Client Sample ID<br>Analyte | Result | Qualifier | Reporting Limit | Units | Method |
|---|---|---|---|---|---|
| **660-33863-4 6B** | | | | | |
| Chlordane (technical) | 14 | I | 17 | ug/Kg | 8081A |
| Dieldrin | 0.29 | I | 1.7 | ug/Kg | 8081A |
| Aluminum | 2000 | | 20 | mg/Kg | 6010B |
| Arsenic | 0.33 | I | 0.50 | mg/Kg | 6010B |
| Boron | 10 | | 5.0 | mg/Kg | 6010B |
| Barium | 9.6 | | 0.99 | mg/Kg | 6010B |
| Calcium | 110000 | | 500 | mg/Kg | 6010B |
| Cobalt | 0.37 | I | 0.99 | mg/Kg | 6010B |
| Chromium | 1.8 | | 0.99 | mg/Kg | 6010B |
| Copper | 5.5 | | 2.0 | mg/Kg | 6010B |
| Iron | 1100 | | 5.0 | mg/Kg | 6010B |
| Magnesium | 1900 | | 50 | mg/Kg | 6010B |
| Manganese | 30 | | 0.99 | mg/Kg | 6010B |
| Sodium | 1400 | | 50 | mg/Kg | 6010B |
| Lead | 14 | | 0.50 | mg/Kg | 6010B |
| Strontium | 2500 | | 40 | mg/Kg | 6010B |
| Titanium | 20 | | 0.99 | mg/Kg | 6010B |
| Vanadium | 3.1 | | 0.99 | mg/Kg | 6010B |
| Zinc | 8.9 | | 2.0 | mg/Kg | 6010B |
| Mercury | 0.014 | I | 0.020 | mg/Kg | 7471A |
| Ammonia (as N) | 14 | | 0.60 | mg/Kg | 350.1 |
| Phosphorus, Total | 670 | | 18 | mg/Kg | 365.4 |
| Total Organic Carbon | 39000 | | 3000 | mg/Kg | 9060 |
| Percent Solids | 22 | | 0.10 | % | Moisture |
| ***Soluble*** | | | | | |
| pH-Soluble | 7.56 | Q | 1.00 | SU | 9045C |
| Orthophosphate-Soluble | 1.9 | I | 3.0 | mg/L | SM 4500 P E |

# EXECUTIVE SUMMARY - Detections

Client: Environmental Engineering Consultant Job Number: 660-33863-1

| Lab Sample ID Client Sample ID<br>Analyte | Result / Qualifier | | Reporting Limit | Units | Method |
|---|---|---|---|---|---|
| **660-33863-5 11A** | | | | | |
| Carbon dioxide (as CO2) | 97 | V | 50 | ug/L | RSK-175 |
| Turbidity | 45 | Q | 0.20 | NTU | 180.1 |
| Nitrate as N | 1.7 | Q | 0.50 | mg/L | 353.2 |
| Biochemical Oxygen Demand | 2.0 | Q,U | 2.00 | mg/L | 405.1 |
| Chlorophyll a | 21.7 | Q | 2.00 | ug/L | SM 10200H |
| Alkalinity | 270 | | 1.0 | mg/L | SM 2320B |
| Salinity | 2.5 | | 2.0 | ppt | SM 2520B |
| Total Suspended Solids | 110 | | 2.0 | mg/L | SM 2540D |
| Sulfate | 150 | | 25 | mg/L | SM 426C |
| Chloride | 950 | | 50 | mg/L | SM 4500 Cl- E |
| Chemical Oxygen Demand | 33 | | 20 | mg/L | SM 5220D |
| Tannins and Lignins | 1.0 | | 0.10 | mg/L | SM 5550B |
| ***Total Recoverable*** | | | | | |
| Iron | 0.24 | | 0.20 | mg/L | 6010B |
| Potassium | 41 | | 1.0 | mg/L | 6010B |
| Magnesium | 80 | | 0.080 | mg/L | 6010B |
| Sodium | 570 | | 10 | mg/L | 6010B |
| Zinc | 0.014 | I | 0.020 | mg/L | 6010B |
| **660-33863-6 8A** | | | | | |
| Carbon dioxide (as CO2) | 140 | V | 50 | ug/L | RSK-175 |
| Turbidity | 6.5 | Q | 0.10 | NTU | 180.1 |
| Biochemical Oxygen Demand | 2.00 | Q,U | 2.00 | mg/L | 405.1 |
| Chlorophyll a | 18.3 | Q | 2.00 | ug/L | SM 10200H |
| Alkalinity | 280 | | 1.0 | mg/L | SM 2320B |
| Total Suspended Solids | 10 | | 1.0 | mg/L | SM 2540D |
| Sulfate | 82 | | 25 | mg/L | SM 426C |
| Chloride | 440 | | 50 | mg/L | SM 4500 Cl- E |
| Chemical Oxygen Demand | 21 | | 20 | mg/L | SM 5220D |
| Tannins and Lignins | 1.2 | | 0.10 | mg/L | SM 5550B |
| ***Total Recoverable*** | | | | | |
| Iron | 0.052 | I | 0.20 | mg/L | 6010B |
| Potassium | 21 | | 1.0 | mg/L | 6010B |
| Magnesium | 47 | | 0.080 | mg/L | 6010B |
| Sodium | 280 | | 10 | mg/L | 6010B |
| Zinc | 0.0076 | I | 0.020 | mg/L | 6010B |

# EXECUTIVE SUMMARY - Detections

Client: Environmental Engineering Consultant Job Number: 660-33863-1

| Lab Sample ID Client Sample ID<br>Analyte | Result / Qualifier | | Reporting Limit | Units | Method |
|---|---|---|---|---|---|
| **660-33863-7 13** | | | | | |
| Carbon dioxide (as CO2) | 110 | V | 50 | ug/L | RSK-175 |
| Dieldrin | 0.016 | | 0.010 | ug/L | 8081A |
| Turbidity | 17 | Q | 0.10 | NTU | 180.1 |
| Nitrite as N | 0.16 | I Q | 0.50 | mg/L | 353.2 |
| Nitrate as N | 5.8 | Q | 0.50 | mg/L | 353.2 |
| Biochemical Oxygen Demand | 2.16 | Q | 2.00 | mg/L | 405.1 |
| Chlorophyll a | 14.9 | Q | 2.00 | ug/L | SM 10200H |
| Alkalinity | 280 | | 1.0 | mg/L | SM 2320B |
| Total Suspended Solids | 31 | | 1.0 | mg/L | SM 2540D |
| Sulfate | 71 | | 10 | mg/L | SM 426C |
| Chloride | 160 | | 20 | mg/L | SM 4500 Cl- E |
| Tannins and Lignins | 0.47 | | 0.10 | mg/L | SM 5550B |
| *Total Recoverable* | | | | | |
| Iron | 0.34 | | 0.20 | mg/L | 6010B |
| Potassium | 11 | | 1.0 | mg/L | 6010B |
| Magnesium | 42 | | 0.080 | mg/L | 6010B |
| Sodium | 110 | | 10 | mg/L | 6010B |
| Zinc | 0.018 | I | 0.020 | mg/L | 6010B |
| **660-33863-8 14** | | | | | |
| Carbon dioxide (as CO2) | 170 | V | 50 | ug/L | RSK-175 |
| Dieldrin | 0.0028 | I | 0.0098 | ug/L | 8081A |
| Turbidity | 79 | Q | 0.20 | NTU | 180.1 |
| Nitrate as N | 0.33 | I Q | 0.50 | mg/L | 353.2 |
| Biochemical Oxygen Demand | 2.73 | Q | 2.00 | mg/L | 405.1 |
| Chlorophyll a | 64.2 | Q | 2.00 | ug/L | SM 10200H |
| Alkalinity | 310 | | 1.0 | mg/L | SM 2320B |
| Total Suspended Solids | 150 | | 1.9 | mg/L | SM 2540D |
| Sulfate | 90 | | 25 | mg/L | SM 426C |
| Chloride | 290 | | 50 | mg/L | SM 4500 Cl- E |
| Chemical Oxygen Demand | 30 | | 20 | mg/L | SM 5220D |
| Tannins and Lignins | 1.0 | | 0.10 | mg/L | SM 5550B |
| *Total Recoverable* | | | | | |
| Iron | 0.33 | | 0.20 | mg/L | 6010B |
| Potassium | 20 | | 1.0 | mg/L | 6010B |
| Magnesium | 53 | | 0.080 | mg/L | 6010B |
| Sodium | 210 | | 10 | mg/L | 6010B |
| Zinc | 0.030 | | 0.020 | mg/L | 6010B |

# EXECUTIVE SUMMARY - Detections

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

| Lab Sample ID Client Sample ID<br>Analyte | Result / Qualifier | | Reporting Limit | Units | Method |
|---|---|---|---|---|---|
| **660-33863-9 12A** | | | | | |
| Carbon dioxide (as CO2) | 100 | V | 50 | ug/L | RSK-175 |
| Turbidity | 3.5 | | 0.10 | NTU | 180.1 |
| Nitrate as N | 0.41 | I | 0.50 | mg/L | 353.2 |
| Biochemical Oxygen Demand | 2.00 | Q,U | 2.00 | mg/L | 405.1 |
| Chlorophyll a | 10.3 | Q | 2.00 | ug/L | SM 10200H |
| Alkalinity | 280 | | 1.0 | mg/L | SM 2320B |
| Salinity | 2.0 | | 2.0 | ppt | SM 2520B |
| Total Suspended Solids | 4.4 | | 1.0 | mg/L | SM 2540D |
| Sulfate | 120 | | 25 | mg/L | SM 426C |
| Chloride | 670 | | 50 | mg/L | SM 4500 Cl- E |
| Chemical Oxygen Demand | 33 | | 20 | mg/L | SM 5220D |
| Tannins and Lignins | 1.1 | | 0.10 | mg/L | SM 5550B |
| ***Total Recoverable*** | | | | | |
| Iron | 0.053 | I | 0.20 | mg/L | 6010B |
| Potassium | 30 | | 1.0 | mg/L | 6010B |
| Magnesium | 62 | | 0.080 | mg/L | 6010B |
| Sodium | 410 | | 10 | mg/L | 6010B |
| Zinc | 0.033 | | 0.020 | mg/L | 6010B |
| **660-33863-10 9A** | | | | | |
| Carbon dioxide (as CO2) | 130 | V | 50 | ug/L | RSK-175 |
| Turbidity | 5.7 | Q | 0.10 | NTU | 180.1 |
| Biochemical Oxygen Demand | 2.00 | Q,U | 2.00 | mg/L | 405.1 |
| Chlorophyll a | 29.6 | Q | 2.00 | ug/L | SM 10200H |
| Alkalinity | 290 | | 1.0 | mg/L | SM 2320B |
| Total Suspended Solids | 16 | | 1.0 | mg/L | SM 2540D |
| Sulfate | 69 | | 10 | mg/L | SM 426C |
| Chloride | 340 | | 50 | mg/L | SM 4500 Cl- E |
| Chemical Oxygen Demand | 20 | | 20 | mg/L | SM 5220D |
| Tannins and Lignins | 1.2 | | 0.10 | mg/L | SM 5550B |
| ***Total Recoverable*** | | | | | |
| Iron | 0.12 | I | 0.20 | mg/L | 6010B |
| Potassium | 17 | | 1.0 | mg/L | 6010B |
| Magnesium | 41 | | 0.080 | mg/L | 6010B |
| Sodium | 210 | | 10 | mg/L | 6010B |
| Zinc | 0.022 | | 0.020 | mg/L | 6010B |

# EXECUTIVE SUMMARY - Detections

Client: Environmental Engineering Consultant Job Number: 660-33863-1

| Lab Sample ID Client Sample ID<br>Analyte | Result / Qualifier | | Reporting Limit | Units | Method |
|---|---|---|---|---|---|
| **660-33863-11 6B** | | | | | |
| Carbon dioxide (as CO2) | 63 | V | 50 | ug/L | RSK-175 |
| Turbidity | 15 | Q | 0.10 | NTU | 180.1 |
| Biochemical Oxygen Demand | 8.72 | Q | 2.00 | mg/L | 405.1 |
| Chlorophyll a | 30.9 | Q | 2.00 | ug/L | SM 10200H |
| Alkalinity | 470 | | 1.0 | mg/L | SM 2320B |
| Salinity | 3.0 | | 2.0 | ppt | SM 2520B |
| Total Suspended Solids | 22 | | 1.0 | mg/L | SM 2540D |
| Sulfate | 140 | | 25 | mg/L | SM 426C |
| Chloride | 960 | | 50 | mg/L | SM 4500 Cl- E |
| Chemical Oxygen Demand | 63 | | 20 | mg/L | SM 5220D |
| Tannins and Lignins | 2.3 | | 0.20 | mg/L | SM 5550B |
| ***Total Recoverable*** | | | | | |
| Iron | 0.16 | I | 0.20 | mg/L | 6010B |
| Potassium | 33 | | 10 | mg/L | 6010B |
| Magnesium | 98 | | 0.080 | mg/L | 6010B |
| Sodium | 620 | | 5.0 | mg/L | 6010B |
| Zinc | 0.015 | I | 0.020 | mg/L | 6010B |

# METHOD SUMMARY

Client: Environmental Engineering Consultant — Job Number: 660-33863-1

| Description | Lab Location | Method | Preparation Method |
|---|---|---|---|
| **Matrix Solid** | | | |
| Organochlorine Pesticides (GC) | TAL TAM | SW846 8081A | |
| Ultrasonic Extraction | TAL TAM | | SW846 3550B |
| Organophosphorous Pesticides (GC) | TAL TAL | SW846 8141A | |
| Ultrasonic Extraction | TAL TAL | | SW846 3550B |
| Herbicides (GC) | TAL TAM | SW846 8151A | |
| Extraction (Herbicides) | TAL TAM | | SW846 8151A |
| Metals (ICP) | TAL TAM | SW846 6010B | |
| Preparation, Metals | TAL TAM | | SW846 3050B |
| Mercury (CVAA) | TAL TAM | SW846 7471A | |
| Preparation, Mercury | TAL TAM | | SW846 7471A |
| Nitrogen, Ammonia | TAL SAV | MCAWW 350.1 | |
| Ammonia ( Sediments) | TAL SAV | | EPA 3-154 |
| Nitrogen, Nitrate-Nitrite | TAL TAM | MCAWW 353.2 | |
| Deionized Water Leaching Procedure | TAL TAM | | ASTM DI Leach |
| Phosphorus, Total | TAL SAV | EPA 365.4 | |
| Phosphorus, Total | TAL SAV | | MCAWW 365.2/365.3/365 |
| Sulfide, Acid Soluble and Insoluble (Titrimetric) | TAL SAV | SW846 9034 | |
| Sulfide, Distillation (Acid Soluble and Insoluble) | TAL SAV | | SW846 9030B |
| Sulfate, Turbidimetric | TAL SAV | SW846 9038 | |
| Deionized Water Leaching Procedure | TAL SAV | | ASTM DI Leach |
| pH | TAL TAM | SW846 9045C | |
| Deionized Water Leaching Procedure | TAL TAM | | ASTM DI Leach |
| Organic Carbon, Total (TOC) | TAL SAV | SW846 9060 | |
| Percent Moisture | TAL TAM | EPA Moisture | |
| Orthophosphate | TAL TAM | SM SM 4500 P E | |
| Deionized Water Leaching Procedure | TAL TAM | | ASTM DI Leach |
| **Matrix Water** | | | |
| Dissolved Gases (GC) | TAL PEN | RSK RSK-175 | |
| Organochlorine Pesticides (GC) | TAL TAM | SW846 8081A | |
| Liquid-Liquid Extraction (Separatory Funnel) | TAL TAM | | SW846 3510C |
| Organophosphorous Pesticides (GC) | TAL TAL | SW846 8141A | |
| Liquid-Liquid Extraction (Continuous) | TAL TAL | | SW846 3520C |
| Herbicides (GC) | TAL TAM | SW846 8151A | |
| Extraction (Herbicides) | TAL TAM | | SW846 8151A |
| Metals (ICP) | TAL TAM | SW846 6010B | |
| Preparation, Total Recoverable or Dissolved Metals | TAL TAM | | SW846 3005A |
| Mercury | TAL TAM | SW846 7470A | |
| Preparation, Mercury | TAL TAM | | SW846 7470A |
| Turbidity, Nephelometric | TAL TAM | MCAWW 180.1 | |

# METHOD SUMMARY

Client: Environmental Engineering Consultant　　Job Number: 660-33863-1

| Description | Lab Location | Method | Preparation Method |
|---|---|---|---|
| **Matrix Water** | | | |
| Nitrite | TAL TAM | MCAWW 353.2 | |
| Phosphorus, Total | TAL TAM | EPA 365.4 | |
| Phosphorus, Total | TAL TAM | | MCAWW 365.2/365.3/365 |
| BOD-5 | TAL ORL | EPA 405.1 | |
| Chlorophyll-a | TAL ORL | SM SM 10200H | |
| Alkalinity | TAL TAM | SM SM 2320B | |
| Salinity | TAL TAM | SM SM 2520B | |
| Solids, Total Suspended (TSS) | TAL TAM | SM SM 2540D | |
| Sulfate | TAL TAM | SM SM 426C | |
| Chloride, Total | TAL TAM | SM SM 4500 Cl- E | |
| Sulfide, Total | TAL TAM | SM SM 4500 S2 F | |
| COD | TAL TAM | SM SM 5220D | |
| COD | TAL TAM | | SM SM 5220 |
| Tannin and Lignin | TAL SAV | SM SM 5550B | |

### Lab References:

TAL ORL = TestAmerica Orlando

TAL PEN = TestAmerica Pensacola

TAL SAV = TestAmerica Savannah

TAL TAL = TestAmerica Tallahassee

TAL TAM = TestAmerica Tampa

### Method References:

ASTM = ASTM International

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

RSK = Sample Prep And Calculations For Dissolved Gas Analysis In Water Samples Using A GC Headspace Equilibration Technique, RSKSOP-175, Rev. 0, 8/11/94, USEPA Research Lab

SM = "Standard Methods For The Examination Of Water And Wastewater",

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

# METHOD / ANALYST SUMMARY

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

| Method | Analyst | Analyst ID |
|---|---|---|
| RSK RSK-175 | Ayers, Kim | KA |
| SW846 8081A | Myers, Randy | RM |
| SW846 8081A | Ortiz, Raymond | RO |
| SW846 8141A | Thomas, Martin L | MLT |
| SW846 8151A | Myers, Randy | RM |
| SW846 6010B | Ramos, Salvador | SR |
| SW846 7470A | Wieland, Kristen | KW |
| SW846 7471A | Wieland, Kristen | KW |
| MCAWW 180.1 | Martin, Randolph | RM |
| MCAWW 350.1 | Ross, Jon | JR |
| MCAWW 353.2 | Steward, Tiffany | TS |
| EPA 365.4 | Martin, Randolph | RM |
| EPA 365.4 | Ross, Jon | JR |
| EPA 405.1 | ANALYST, SUBCONTRACTED | SUB |
| SW846 9034 | Vasquez, Juana | JV |
| SW846 9038 | Ross, Jon | JR |
| SW846 9045C | Sengsouvanna, Dom | DS |
| SW846 9060 | Blackshear, Kim | KB |
| EPA Moisture | Volz, Charles | CV |
| SM SM 10200H | ANALYST, SUBCONTRACTED | SUB |
| SM SM 2320B | Steward, Tiffany | TS |
| SM SM 2520B | Mostafavifar, Efe | EM |
| SM SM 2540D | Oonnoonny, Thomas | TO |
| SM SM 426C | Cerome, Saurel | SC |
| SM SM 4500 Cl- E | Mostafavifar, Efe | EM |
| SM SM 4500 P E | Mostafavifar, Efe | EM |
| SM SM 4500 S2 F | Mostafavifar, Efe | EM |
| SM SM 5220D | Cerome, Saurel | SC |
| SM SM 5550B | Ross, Jon | JR |

# SAMPLE SUMMARY

Client: Environmental Engineering Consultant  Job Number: 660-33863-1

| Lab Sample ID | Client Sample ID | Client Matrix | Date/Time Sampled | Date/Time Received |
|---|---|---|---|---|
| 660-33863-1 | 11A | Solid | 02/15/2010 1020 | 02/17/2010 0900 |
| 660-33863-2 | 13 | Solid | 02/15/2010 1110 | 02/17/2010 0900 |
| 660-33863-3 | 8A | Solid | 02/15/2010 1340 | 02/17/2010 0900 |
| 660-33863-4 | 6B | Solid | 02/15/2010 1400 | 02/17/2010 0900 |
| 660-33863-5 | 11A | Water | 02/15/2010 1010 | 02/17/2010 0900 |
| 660-33863-6 | 8A | Water | 02/15/2010 1330 | 02/17/2010 0900 |
| 660-33863-7 | 13 | Water | 02/15/2010 1100 | 02/17/2010 0900 |
| 660-33863-8 | 14 | Water | 02/15/2010 1140 | 02/17/2010 0900 |
| 660-33863-9 | 12A | Water | 02/15/2010 1350 | 02/17/2010 0900 |
| 660-33863-10 | 9A | Water | 02/15/2010 1250 | 02/17/2010 0900 |
| 660-33863-11 | 6B | Water | 02/15/2010 1450 | 02/17/2010 0900 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Client Sample ID:** **11A**

Lab Sample ID: 660-33863-5
Client Matrix: Water

Date Sampled: 02/15/2010 1010
Date Received: 02/17/2010 0900

---

### RSK-175 Dissolved Gases (GC)

Method: RSK-175
Preparation: N/A
Dilution: 1.0
Date Analyzed: 02/26/2010 0821
Date Prepared:

Analysis Batch: 400-104462

Instrument ID: NOEQUIP
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL
Injection Volume:

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Carbon dioxide (as CO2) | 97 | V | 7.0 | 50 |

## Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Client Sample ID:** **8A**

Lab Sample ID: 660-33863-6
Client Matrix: Water

Date Sampled: 02/15/2010 1330
Date Received: 02/17/2010 0900

---

### RSK-175 Dissolved Gases (GC)

Method: RSK-175
Preparation: N/A
Dilution: 1.0
Date Analyzed: 02/26/2010 0845
Date Prepared:

Analysis Batch: 400-104462

Instrument ID: NOEQUIP
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL
Injection Volume:

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Carbon dioxide (as CO2) | 140 | V | 7.0 | 50 |

# Analytical Data

Client: Environmental Engineering Consultant | Job Number: 660-33863-1

**Client Sample ID: 13**

|  |  |  |  |
|---|---|---|---|
| Lab Sample ID: | 660-33863-7 | Date Sampled: | 02/15/2010 1100 |
| Client Matrix: | Water | Date Received: | 02/17/2010 0900 |

### RSK-175 Dissolved Gases (GC)

|  |  |  |  |  |
|---|---|---|---|---|
| Method: | RSK-175 | Analysis Batch: 400-104462 | Instrument ID: | NOEQUIP |
| Preparation: | N/A |  | Lab File ID: | N/A |
| Dilution: | 1.0 |  | Initial Weight/Volume: | 1.0 mL |
| Date Analyzed: | 02/26/2010 0859 |  | Final Weight/Volume: | 1.0 mL |
| Date Prepared: |  |  | Injection Volume: |  |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Carbon dioxide (as CO2) | 110 | V | 7.0 | 50 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Client Sample ID:** **14**

|  |  |  |  |
|---|---|---|---|
| Lab Sample ID: | 660-33863-8 | Date Sampled: | 02/15/2010 1140 |
| Client Matrix: | Water | Date Received: | 02/17/2010 0900 |

---

**RSK-175 Dissolved Gases (GC)**

|  |  |  |  |  |
|---|---|---|---|---|
| Method: | RSK-175 | Analysis Batch: 400-104462 | Instrument ID: | NOEQUIP |
| Preparation: | N/A |  | Lab File ID: | N/A |
| Dilution: | 1.0 |  | Initial Weight/Volume: | 1.0 mL |
| Date Analyzed: | 02/26/2010 0911 |  | Final Weight/Volume: | 1.0 mL |
| Date Prepared: |  |  | Injection Volume: |  |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Carbon dioxide (as CO2) | 170 | V | 7.0 | 50 |

**Client Sample ID:** **12A**

Lab Sample ID: 660-33863-9
Client Matrix: Water
Date Sampled: 02/15/2010 1350
Date Received: 02/17/2010 0900

---

### RSK-175 Dissolved Gases (GC)

Method: RSK-175
Preparation: N/A
Dilution: 1.0
Date Analyzed: 02/26/2010 0923
Date Prepared:

Analysis Batch: 400-104462

Instrument ID: NOEQUIP
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL
Injection Volume:

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Carbon dioxide (as CO2) | 100 | V | 7.0 | 50 |

**Client Sample ID:** **9A**

Lab Sample ID: 660-33863-10
Client Matrix: Water

Date Sampled: 02/15/2010 1250
Date Received: 02/17/2010 0900

### RSK-175 Dissolved Gases (GC)

| | | | | |
|---|---|---|---|---|
| Method: | RSK-175 | Analysis Batch: 400-104462 | Instrument ID: | NOEQUIP |
| Preparation: | N/A | | Lab File ID: | N/A |
| Dilution: | 1.0 | | Initial Weight/Volume: | 1.0 mL |
| Date Analyzed: | 02/26/2010 0937 | | Final Weight/Volume: | 1.0 mL |
| Date Prepared: | | | Injection Volume: | |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Carbon dioxide (as CO2) | 130 | V | 7.0 | 50 |

**Client Sample ID:** **6B**

Lab Sample ID: 660-33863-11
Client Matrix: Water

Date Sampled: 02/15/2010 1450
Date Received: 02/17/2010 0900

### RSK-175 Dissolved Gases (GC)

Method: RSK-175
Preparation: N/A
Dilution: 1.0
Date Analyzed: 02/26/2010 1001
Date Prepared:

Analysis Batch: 400-104462

Instrument ID: NOEQUIP
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL
Injection Volume:

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Carbon dioxide (as CO2) | 63 | V | 7.0 | 50 |

# Analytical Data

Client: Environmental Engineering Consultant Job Number: 660-33863-1

**Client Sample ID:** **11A**

Lab Sample ID: 660-33863-1 Date Sampled: 02/15/2010 1020
Client Matrix: Solid Date Received: 02/17/2010 0900

---

## 8081A Organochlorine Pesticides (GC)

| | | | | | |
|---|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-90917 | | Instrument ID: | BSGJ |
| Preparation: | 3550B | Prep Batch: 660-90841 | | Initial Weight/Volume: | 30.15 g |
| Dilution: | 1.0 | | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/19/2010 1601 | | | Injection Volume: | 2 uL |
| Date Prepared: | 02/19/2010 0657 | | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Endrin aldehyde | | 0.50 | U | 0.50 | 4.0 |

# Analytical Data

Client: Environmental Engineering Consultant | Job Number: 660-33863-1

**Client Sample ID: 11A**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33863-1 | Date Sampled: 02/15/2010 1020 |
| Client Matrix: | Solid | Date Received: 02/17/2010 0900 |

### 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-90917 | Instrument ID: | BSGJ |
| Preparation: | 3550B | Prep Batch: 660-90841 | Initial Weight/Volume: | 30.15 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/23/2010 1733 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/19/2010 0657 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| 4,4'-DDD | | 0.50 | U | 0.50 | 3.3 |
| 4,4'-DDE | | 0.50 | U | 0.50 | 3.3 |
| 4,4'-DDT | | 0.50 | U | 0.50 | 3.3 |
| Aldrin | | 0.50 | U | 0.50 | 2.0 |
| alpha-BHC | | 0.14 | U | 0.14 | 1.7 |
| beta-BHC | | 0.50 | U | 0.50 | 2.0 |
| Chlordane (technical) | | 2.4 | U | 2.4 | 17 |
| delta-BHC | | 0.50 | U | 0.50 | 2.0 |
| Dieldrin | | 0.15 | U | 0.15 | 1.7 |
| Endosulfan I | | 0.25 | U | 0.25 | 2.0 |
| Endosulfan II | | 0.25 | U | 0.25 | 3.3 |
| Endosulfan sulfate | | 0.25 | U | 0.25 | 3.3 |
| Endrin | | 0.50 | U | 0.50 | 4.0 |
| Endrin ketone | | 0.50 | U | 0.50 | 4.0 |
| gamma-BHC (Lindane) | | 0.50 | U | 0.50 | 2.0 |
| Heptachlor | | 0.50 | U | 0.50 | 2.0 |
| Heptachlor epoxide | | 0.14 | U | 0.14 | 2.0 |
| Methoxychlor | | 1.0 | U | 1.0 | 17 |
| Toxaphene | | 29 | U | 29 | 170 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 46 | | 30 - 150 |
| Tetrachloro-m-xylene | 64 | | 30 - 150 |

## Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Client Sample ID:** **13**

Lab Sample ID: 660-33863-2
Client Matrix: Solid

Date Sampled: 02/15/2010 1110
Date Received: 02/17/2010 0900

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### 8081A Organochlorine Pesticides (GC)

| | | | | | |
|---|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-90917 | | Instrument ID: | BSGJ |
| Preparation: | 3550B | Prep Batch: 660-90841 | | Initial Weight/Volume: | 30.18 g |
| Dilution: | 1.0 | | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/19/2010 1614 | | | Injection Volume: | 2 uL |
| Date Prepared: | 02/19/2010 0657 | | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Endrin aldehyde | | 0.50 | U | 0.50 | 4.0 |

**Client Sample ID:** **13**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33863-2 | Date Sampled: | 02/15/2010 1110 |
| Client Matrix: | Solid | Date Received: | 02/17/2010 0900 |

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## 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-90917 | Instrument ID: | BSGJ |
| Preparation: | 3550B | Prep Batch: 660-90841 | Initial Weight/Volume: | 30.18 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/23/2010 1747 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/19/2010 0657 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| 4,4'-DDD | | 0.50 | U | 0.50 | 3.3 |
| 4,4'-DDE | | 0.50 | U | 0.50 | 3.3 |
| 4,4'-DDT | | 0.50 | U | 0.50 | 3.3 |
| Aldrin | | 0.50 | U | 0.50 | 2.0 |
| alpha-BHC | | 0.14 | U | 0.14 | 1.7 |
| beta-BHC | | 0.50 | U | 0.50 | 2.0 |
| Chlordane (technical) | | 2.4 | U | 2.4 | 17 |
| delta-BHC | | 0.50 | U | 0.50 | 2.0 |
| Dieldrin | | 1.0 | I | 0.15 | 1.7 |
| Endosulfan I | | 0.25 | U | 0.25 | 2.0 |
| Endosulfan II | | 0.25 | U | 0.25 | 3.3 |
| Endosulfan sulfate | | 0.25 | U | 0.25 | 3.3 |
| Endrin | | 0.50 | U | 0.50 | 4.0 |
| Endrin ketone | | 0.50 | U | 0.50 | 4.0 |
| gamma-BHC (Lindane) | | 0.50 | U | 0.50 | 2.0 |
| Heptachlor | | 0.50 | U | 0.50 | 2.0 |
| Heptachlor epoxide | | 0.14 | U | 0.14 | 2.0 |
| Methoxychlor | | 0.99 | U | 0.99 | 17 |
| Toxaphene | | 29 | U | 29 | 170 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 51 | | 30 - 150 |
| Tetrachloro-m-xylene | 68 | | 30 - 150 |

**Client Sample ID:** **8A**

|  |  |  |
|---|---|---|
| Lab Sample ID: | 660-33863-3 | Date Sampled: 02/15/2010 1340 |
| Client Matrix: | Solid | Date Received: 02/17/2010 0900 |

### 8081A Organochlorine Pesticides (GC)

|  |  |  |  |  |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-90917 | Instrument ID: | BSGJ |
| Preparation: | 3550B | Prep Batch: 660-90841 | Initial Weight/Volume: | 30.05 g |
| Dilution: | 1.0 |  | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/19/2010 1628 |  | Injection Volume: | 2 uL |
| Date Prepared: | 02/19/2010 0657 |  | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| 4,4'-DDD |  | 0.50 | U | 0.50 | 3.3 |
| 4,4'-DDE |  | 0.50 | U | 0.50 | 3.3 |
| 4,4'-DDT |  | 0.50 | U J3 | 0.50 | 3.3 |
| Aldrin |  | 0.50 | U J3 | 0.50 | 2.0 |
| alpha-BHC |  | 0.14 | U | 0.14 | 1.7 |
| beta-BHC |  | 0.50 | U | 0.50 | 2.0 |
| Chlordane (technical) |  | 2.4 | U | 2.4 | 17 |
| delta-BHC |  | 0.50 | U | 0.50 | 2.0 |
| Dieldrin |  | 0.15 | U | 0.15 | 1.7 |
| Endosulfan I |  | 0.25 | U | 0.25 | 2.0 |
| Endosulfan II |  | 0.25 | U | 0.25 | 3.3 |
| Endosulfan sulfate |  | 0.25 | U | 0.25 | 3.3 |
| Endrin |  | 0.50 | U J3 | 0.50 | 4.0 |
| Endrin aldehyde |  | 0.50 | U J3 | 0.50 | 4.0 |
| Endrin ketone |  | 0.50 | U | 0.50 | 4.0 |
| gamma-BHC (Lindane) |  | 0.50 | U | 0.50 | 2.0 |
| Heptachlor |  | 0.50 | U | 0.50 | 2.0 |
| Heptachlor epoxide |  | 0.14 | U | 0.14 | 2.0 |
| Methoxychlor |  | 1.0 | U | 1.0 | 17 |
| Toxaphene |  | 29 | U | 29 | 170 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 30 |  | 30 - 150 |
| Tetrachloro-m-xylene | 57 |  | 30 - 150 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Client Sample ID:** **6B**

Lab Sample ID: 660-33863-4

Client Matrix: Solid

Date Sampled: 02/15/2010 1400

Date Received: 02/17/2010 0900

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## 8081A Organochlorine Pesticides (GC)

| | | | | | |
|---|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-90917 | | Instrument ID: | BSGJ |
| Preparation: | 3550B | Prep Batch: 660-90841 | | Initial Weight/Volume: | 29.85 g |
| Dilution: | 1.0 | | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/19/2010 1641 | | | Injection Volume: | 2 uL |
| Date Prepared: | 02/19/2010 0657 | | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Endrin aldehyde | | 0.50 | U | 0.50 | 4.0 |

# Analytical Data

Client: Environmental Engineering Consultant | Job Number: 660-33863-1

**Client Sample ID:** **6B**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33863-4 | Date Sampled: | 02/15/2010 1400 |
| Client Matrix: | Solid | Date Received: | 02/17/2010 0900 |

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### 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-90917 | Instrument ID: | BSGJ |
| Preparation: | 3550B | Prep Batch: 660-90841 | Initial Weight/Volume: | 29.85 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/23/2010 1800 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/19/2010 0657 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| 4,4'-DDD | | 0.50 | U | 0.50 | 3.3 |
| 4,4'-DDE | | 0.50 | U | 0.50 | 3.3 |
| 4,4'-DDT | | 0.50 | U | 0.50 | 3.3 |
| Aldrin | | 0.50 | U | 0.50 | 2.0 |
| alpha-BHC | | 0.14 | U | 0.14 | 1.7 |
| beta-BHC | | 0.50 | U | 0.50 | 2.0 |
| delta-BHC | | 0.50 | U | 0.50 | 2.0 |
| Dieldrin | | 0.29 | I | 0.15 | 1.7 |
| Endosulfan I | | 0.25 | U | 0.25 | 2.0 |
| Endosulfan II | | 0.25 | U | 0.25 | 3.3 |
| Endosulfan sulfate | | 0.25 | U | 0.25 | 3.3 |
| Endrin | | 0.50 | U | 0.50 | 4.0 |
| Endrin ketone | | 0.50 | U | 0.50 | 4.0 |
| gamma-BHC (Lindane) | | 0.50 | U | 0.50 | 2.0 |
| Heptachlor | | 0.50 | U | 0.50 | 2.0 |
| Heptachlor epoxide | | 0.14 | U | 0.14 | 2.0 |
| Methoxychlor | | 1.0 | U | 1.0 | 17 |
| Toxaphene | | 29 | U | 29 | 170 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 56 | | 30 - 150 |
| Tetrachloro-m-xylene | 80 | | 30 - 150 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Client Sample ID:** **6B**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33863-4 | Date Sampled: 02/15/2010 1400 |
| Client Matrix: | Solid | Date Received: 02/17/2010 0900 |

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### 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-90917 | Instrument ID: | BSGJ |
| Preparation: | 3550B | Prep Batch: 660-90841 | Initial Weight/Volume: | 29.85 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/25/2010 2242 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/19/2010 0657 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Chlordane (technical) | | 14 | I | 2.4 | 17 |

**Client Sample ID:** **11A**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33863-5 | Date Sampled: 02/15/2010 1010 |
| Client Matrix: | Water | Date Received: 02/17/2010 0900 |

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### 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91002 | Instrument ID: | BSGJ |
| Preparation: | 3510C | Prep Batch: 660-90781 | Initial Weight/Volume: | 1050 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/19/2010 2146 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/18/2010 0642 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 4,4'-DDD | 0.0039 | U | 0.0039 | 0.0095 |
| 4,4'-DDE | 0.0052 | U | 0.0052 | 0.0095 |
| 4,4'-DDT | 0.0030 | U | 0.0030 | 0.0095 |
| Aldrin | 0.0017 | U | 0.0017 | 0.0095 |
| alpha-BHC | 0.0027 | U | 0.0027 | 0.0095 |
| beta-BHC | 0.0025 | U | 0.0025 | 0.0095 |
| Chlordane (technical) | 0.054 | U | 0.054 | 0.48 |
| delta-BHC | 0.0026 | U | 0.0026 | 0.0095 |
| Dieldrin | 0.0013 | U | 0.0013 | 0.0095 |
| Endosulfan I | 0.0033 | U | 0.0033 | 0.0095 |
| Endosulfan II | 0.0031 | U | 0.0031 | 0.0095 |
| Endosulfan sulfate | 0.0028 | U | 0.0028 | 0.0095 |
| Endrin | 0.0030 | U | 0.0030 | 0.0095 |
| Endrin aldehyde | 0.0030 | U | 0.0030 | 0.0095 |
| Endrin ketone | 0.0051 | U | 0.0051 | 0.095 |
| gamma-BHC (Lindane) | 0.0025 | U | 0.0025 | 0.0095 |
| Heptachlor | 0.0029 | U | 0.0029 | 0.0095 |
| Heptachlor epoxide | 0.0030 | U | 0.0030 | 0.0095 |
| Methoxychlor | 0.0048 | U | 0.0048 | 0.0095 |
| Toxaphene | 0.69 | U | 0.69 | 2.9 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 54 | | 30 - 150 |
| Tetrachloro-m-xylene | 83 | | 30 - 150 |

**Client Sample ID:** **8A**

Lab Sample ID: 660-33863-6
Client Matrix: Water

Date Sampled: 02/15/2010 1330
Date Received: 02/17/2010 0900

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### 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91002 | Instrument ID: | BSGJ |
| Preparation: | 3510C | Prep Batch: 660-90781 | Initial Weight/Volume: | 1050 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/19/2010 2200 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/18/2010 0642 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 4,4'-DDD | 0.0039 | U | 0.0039 | 0.0095 |
| 4,4'-DDE | 0.0052 | U | 0.0052 | 0.0095 |
| 4,4'-DDT | 0.0030 | U | 0.0030 | 0.0095 |
| Aldrin | 0.0017 | U | 0.0017 | 0.0095 |
| alpha-BHC | 0.0027 | U | 0.0027 | 0.0095 |
| beta-BHC | 0.0025 | U | 0.0025 | 0.0095 |
| Chlordane (technical) | 0.054 | U | 0.054 | 0.48 |
| delta-BHC | 0.0026 | U | 0.0026 | 0.0095 |
| Dieldrin | 0.0013 | U | 0.0013 | 0.0095 |
| Endosulfan I | 0.0033 | U | 0.0033 | 0.0095 |
| Endosulfan II | 0.0031 | U | 0.0031 | 0.0095 |
| Endosulfan sulfate | 0.0028 | U | 0.0028 | 0.0095 |
| Endrin | 0.0030 | U | 0.0030 | 0.0095 |
| Endrin aldehyde | 0.0030 | U | 0.0030 | 0.0095 |
| Endrin ketone | 0.0051 | U | 0.0051 | 0.095 |
| gamma-BHC (Lindane) | 0.0025 | U | 0.0025 | 0.0095 |
| Heptachlor | 0.0029 | U | 0.0029 | 0.0095 |
| Heptachlor epoxide | 0.0030 | U | 0.0030 | 0.0095 |
| Methoxychlor | 0.0048 | U | 0.0048 | 0.0095 |
| Toxaphene | 0.69 | U | 0.69 | 2.9 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 55 | | 30 - 150 |
| Tetrachloro-m-xylene | 80 | | 30 - 150 |

**Client Sample ID:** **13**

|  |  |  |
|---|---|---|
| Lab Sample ID: | 660-33863-7 | Date Sampled: 02/15/2010 1100 |
| Client Matrix: | Water | Date Received: 02/17/2010 0900 |

### 8081A Organochlorine Pesticides (GC)

|  |  |  |  |  |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91002 | Instrument ID: | BSGJ |
| Preparation: | 3510C | Prep Batch: 660-90781 | Initial Weight/Volume: | 1000 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/19/2010 2213 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/18/2010 0642 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 4,4'-DDD | 0.0041 | U | 0.0041 | 0.010 |
| 4,4'-DDE | 0.0055 | U | 0.0055 | 0.010 |
| 4,4'-DDT | 0.0032 | U | 0.0032 | 0.010 |
| Aldrin | 0.0018 | U | 0.0018 | 0.010 |
| alpha-BHC | 0.0028 | U | 0.0028 | 0.010 |
| beta-BHC | 0.0027 | U | 0.0027 | 0.010 |
| Chlordane (technical) | 0.057 | U | 0.057 | 0.50 |
| delta-BHC | 0.0028 | U | 0.0028 | 0.010 |
| Dieldrin | 0.016 | | 0.0014 | 0.010 |
| Endosulfan I | 0.0034 | U | 0.0034 | 0.010 |
| Endosulfan II | 0.0033 | U | 0.0033 | 0.010 |
| Endosulfan sulfate | 0.0030 | U | 0.0030 | 0.010 |
| Endrin | 0.0031 | U | 0.0031 | 0.010 |
| Endrin aldehyde | 0.0032 | U | 0.0032 | 0.010 |
| Endrin ketone | 0.0054 | U | 0.0054 | 0.10 |
| gamma-BHC (Lindane) | 0.0026 | U | 0.0026 | 0.010 |
| Heptachlor | 0.0031 | U | 0.0031 | 0.010 |
| Heptachlor epoxide | 0.0031 | U | 0.0031 | 0.010 |
| Methoxychlor | 0.0051 | U | 0.0051 | 0.010 |
| Toxaphene | 0.72 | U | 0.72 | 3.0 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 60 | | 30 - 150 |
| Tetrachloro-m-xylene | 83 | | 30 - 150 |

**Client Sample ID: 14**

Lab Sample ID: 660-33863-8
Client Matrix: Water

Date Sampled: 02/15/2010 1140
Date Received: 02/17/2010 0900

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## 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91002 | Instrument ID: | BSGJ |
| Preparation: | 3510C | Prep Batch: 660-90781 | Initial Weight/Volume: | 1020 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/19/2010 2226 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/18/2010 0642 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 4,4'-DDD | 0.0040 | U | 0.0040 | 0.0098 |
| 4,4'-DDE | 0.0054 | U | 0.0054 | 0.0098 |
| 4,4'-DDT | 0.0031 | U | 0.0031 | 0.0098 |
| Aldrin | 0.0018 | U | 0.0018 | 0.0098 |
| alpha-BHC | 0.0027 | U | 0.0027 | 0.0098 |
| beta-BHC | 0.0026 | U | 0.0026 | 0.0098 |
| Chlordane (technical) | 0.056 | U | 0.056 | 0.49 |
| delta-BHC | 0.0027 | U | 0.0027 | 0.0098 |
| Dieldrin | 0.0028 | I | 0.0014 | 0.0098 |
| Endosulfan I | 0.0034 | U | 0.0034 | 0.0098 |
| Endosulfan II | 0.0032 | U | 0.0032 | 0.0098 |
| Endosulfan sulfate | 0.0029 | U | 0.0029 | 0.0098 |
| Endrin | 0.0031 | U | 0.0031 | 0.0098 |
| Endrin aldehyde | 0.0031 | U | 0.0031 | 0.0098 |
| Endrin ketone | 0.0053 | U | 0.0053 | 0.098 |
| gamma-BHC (Lindane) | 0.0026 | U | 0.0026 | 0.0098 |
| Heptachlor | 0.0030 | U | 0.0030 | 0.0098 |
| Heptachlor epoxide | 0.0031 | U | 0.0031 | 0.0098 |
| Methoxychlor | 0.0050 | U | 0.0050 | 0.0098 |
| Toxaphene | 0.71 | U | 0.71 | 2.9 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 54 | | 30 - 150 |
| Tetrachloro-m-xylene | 83 | | 30 - 150 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Client Sample ID:** **12A**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33863-9 | Date Sampled: 02/15/2010 1350 |
| Client Matrix: | Water | Date Received: 02/17/2010 0900 |

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## 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91002 | Instrument ID: | BSGJ |
| Preparation: | 3510C | Prep Batch: 660-90781 | Initial Weight/Volume: | 1050 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/19/2010 2240 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/18/2010 0642 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 4,4'-DDD | 0.0039 | U | 0.0039 | 0.0095 |
| 4,4'-DDE | 0.0052 | U | 0.0052 | 0.0095 |
| 4,4'-DDT | 0.0030 | U | 0.0030 | 0.0095 |
| Aldrin | 0.0017 | U | 0.0017 | 0.0095 |
| alpha-BHC | 0.0027 | U | 0.0027 | 0.0095 |
| beta-BHC | 0.0025 | U | 0.0025 | 0.0095 |
| Chlordane (technical) | 0.054 | U | 0.054 | 0.48 |
| delta-BHC | 0.0026 | U | 0.0026 | 0.0095 |
| Dieldrin | 0.0013 | U | 0.0013 | 0.0095 |
| Endosulfan I | 0.0033 | U | 0.0033 | 0.0095 |
| Endosulfan II | 0.0031 | U | 0.0031 | 0.0095 |
| Endosulfan sulfate | 0.0028 | U | 0.0028 | 0.0095 |
| Endrin | 0.0030 | U | 0.0030 | 0.0095 |
| Endrin aldehyde | 0.0030 | U | 0.0030 | 0.0095 |
| Endrin ketone | 0.0051 | U | 0.0051 | 0.095 |
| gamma-BHC (Lindane) | 0.0025 | U | 0.0025 | 0.0095 |
| Heptachlor | 0.0029 | U | 0.0029 | 0.0095 |
| Heptachlor epoxide | 0.0030 | U | 0.0030 | 0.0095 |
| Methoxychlor | 0.0048 | U | 0.0048 | 0.0095 |
| Toxaphene | 0.69 | U | 0.69 | 2.9 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 55 | | 30 - 150 |
| Tetrachloro-m-xylene | 81 | | 30 - 150 |

**Client Sample ID:** **9A**

Lab Sample ID: 660-33863-10
Client Matrix: Water

Date Sampled: 02/15/2010 1250
Date Received: 02/17/2010 0900

### 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91002 | Instrument ID: | BSGJ |
| Preparation: | 3510C | Prep Batch: 660-90781 | Initial Weight/Volume: | 1050 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/19/2010 2253 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/18/2010 0642 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 4,4'-DDD | 0.0039 | U | 0.0039 | 0.0095 |
| 4,4'-DDE | 0.0052 | U | 0.0052 | 0.0095 |
| 4,4'-DDT | 0.0030 | U | 0.0030 | 0.0095 |
| Aldrin | 0.0017 | U | 0.0017 | 0.0095 |
| alpha-BHC | 0.0027 | U | 0.0027 | 0.0095 |
| beta-BHC | 0.0025 | U | 0.0025 | 0.0095 |
| Chlordane (technical) | 0.054 | U | 0.054 | 0.48 |
| delta-BHC | 0.0026 | U | 0.0026 | 0.0095 |
| Dieldrin | 0.0013 | U | 0.0013 | 0.0095 |
| Endosulfan I | 0.0033 | U | 0.0033 | 0.0095 |
| Endosulfan II | 0.0031 | U | 0.0031 | 0.0095 |
| Endosulfan sulfate | 0.0028 | U | 0.0028 | 0.0095 |
| Endrin | 0.0030 | U | 0.0030 | 0.0095 |
| Endrin aldehyde | 0.0030 | U | 0.0030 | 0.0095 |
| Endrin ketone | 0.0051 | U | 0.0051 | 0.095 |
| gamma-BHC (Lindane) | 0.0025 | U | 0.0025 | 0.0095 |
| Heptachlor | 0.0029 | U | 0.0029 | 0.0095 |
| Heptachlor epoxide | 0.0030 | U | 0.0030 | 0.0095 |
| Methoxychlor | 0.0048 | U | 0.0048 | 0.0095 |
| Toxaphene | 0.69 | U | 0.69 | 2.9 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 50 | | 30 - 150 |
| Tetrachloro-m-xylene | 80 | | 30 - 150 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Client Sample ID:** **6B**

Lab Sample ID: 660-33863-11

Client Matrix: Water

Date Sampled: 02/15/2010 1450

Date Received: 02/17/2010 0900

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## 8081A Organochlorine Pesticides (GC)

|  |  |  |  |  |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91002 | Instrument ID: | BSGJ |
| Preparation: | 3510C | Prep Batch: 660-90781 | Initial Weight/Volume: | 1050 mL |
| Dilution: | 1.0 |  | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/19/2010 2307 |  | Injection Volume: | 2 uL |
| Date Prepared: | 02/18/2010 0642 |  | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 4,4'-DDD | 0.0039 | U | 0.0039 | 0.0095 |
| 4,4'-DDE | 0.0052 | U | 0.0052 | 0.0095 |
| 4,4'-DDT | 0.0030 | U | 0.0030 | 0.0095 |
| Aldrin | 0.0017 | U | 0.0017 | 0.0095 |
| alpha-BHC | 0.0027 | U | 0.0027 | 0.0095 |
| beta-BHC | 0.0025 | U | 0.0025 | 0.0095 |
| Chlordane (technical) | 0.054 | U | 0.054 | 0.48 |
| delta-BHC | 0.0026 | U | 0.0026 | 0.0095 |
| Dieldrin | 0.0013 | U | 0.0013 | 0.0095 |
| Endosulfan I | 0.0033 | U | 0.0033 | 0.0095 |
| Endosulfan II | 0.0031 | U | 0.0031 | 0.0095 |
| Endosulfan sulfate | 0.0028 | U | 0.0028 | 0.0095 |
| Endrin | 0.0030 | U | 0.0030 | 0.0095 |
| Endrin aldehyde | 0.0030 | U | 0.0030 | 0.0095 |
| Endrin ketone | 0.0051 | U | 0.0051 | 0.095 |
| gamma-BHC (Lindane) | 0.0025 | U | 0.0025 | 0.0095 |
| Heptachlor | 0.0029 | U | 0.0029 | 0.0095 |
| Heptachlor epoxide | 0.0030 | U | 0.0030 | 0.0095 |
| Methoxychlor | 0.0048 | U | 0.0048 | 0.0095 |
| Toxaphene | 0.69 | U | 0.69 | 2.9 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 45 |  | 30 - 150 |
| Tetrachloro-m-xylene | 78 |  | 30 - 150 |

**Client Sample ID:** **11A**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33863-1 | Date Sampled: | 02/15/2010 1020 |
| Client Matrix: | Solid | Date Received: | 02/17/2010 0900 |

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### 8141A Organophosphorous Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-65935 | Instrument ID: | SGF |
| Preparation: | 3550B | Prep Batch: 640-65855 | Initial Weight/Volume: | 00030.36 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10.0 mL |
| Date Analyzed: | 02/24/2010 1532 | | Injection Volume: | 1 uL |
| Date Prepared: | 02/22/2010 1006 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Azinphos-methyl | | 4.3 | U | 4.3 | 65 |
| Bolstar | | 8.4 | U | 8.4 | 33 |
| Chlorpyrifos | | 8.3 | U | 8.3 | 33 |
| Coumaphos | | 8.5 | U | 8.5 | 330 |
| Demeton, Total | | 13 | U | 13 | 82 |
| Diazinon | | 8.7 | U | 8.7 | 33 |
| Dichlorvos | | 17 | U | 17 | 65 |
| Dimethoate | | 9.9 | U | 9.9 | 65 |
| Disulfoton | | 11 | U | 11 | 65 |
| EPN | | 9.0 | U | 9.0 | 33 |
| Ethoprop | | 15 | U | 15 | 17 |
| Ethyl Parathion | | 8.7 | U | 8.7 | 33 |
| Fensulfothion | | 9.9 | U | 9.9 | 330 |
| Hexazinone | | 7.6 | U | 7.6 | 33 |
| Malathion | | 8.9 | U | 8.9 | 33 |
| Merphos | | 8.2 | U | 8.2 | 33 |
| Methyl parathion | | 5.3 | U | 5.3 | 17 |
| Mevinphos | | 11 | U | 11 | 65 |
| Monochrotophos | | 84 | U | 84 | 330 |
| Naled | | 5.1 | U | 5.1 | 330 |
| Phorate | | 11 | U | 11 | 33 |
| Ronnel | | 7.9 | U | 7.9 | 33 |
| Stirophos | | 8.8 | U | 8.8 | 33 |
| Sulfotepp | | 5.2 | U | 5.2 | 17 |
| Tokuthion | | 7.6 | U | 7.6 | 33 |
| Trichloronate | | 8.1 | U | 8.1 | 330 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 71 | | 35 - 134 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Client Sample ID:** **13**

Lab Sample ID: 660-33863-2
Client Matrix: Solid

Date Sampled: 02/15/2010 1110
Date Received: 02/17/2010 0900

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### 8141A Organophosphorous Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-65935 | Instrument ID: | SGF |
| Preparation: | 3550B | Prep Batch: 640-65855 | Initial Weight/Volume: | 00030.04 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10.0 mL |
| Date Analyzed: | 02/24/2010 1546 | | Injection Volume: | 1 uL |
| Date Prepared: | 02/22/2010 1006 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Azinphos-methyl | | 4.4 | U | 4.4 | 66 |
| Bolstar | | 8.5 | U | 8.5 | 33 |
| Chlorpyrifos | | 8.4 | U | 8.4 | 33 |
| Coumaphos | | 8.6 | U | 8.6 | 330 |
| Demeton, Total | | 13 | U | 13 | 83 |
| Diazinon | | 8.8 | U | 8.8 | 33 |
| Dichlorvos | | 17 | U | 17 | 66 |
| Dimethoate | | 10 | U | 10 | 66 |
| Disulfoton | | 11 | U | 11 | 66 |
| EPN | | 9.1 | U | 9.1 | 33 |
| Ethoprop | | 15 | U | 15 | 17 |
| Ethyl Parathion | | 8.8 | U | 8.8 | 33 |
| Fensulfothion | | 10 | U | 10 | 330 |
| Hexazinone | | 7.7 | U | 7.7 | 33 |
| Malathion | | 9.0 | U | 9.0 | 33 |
| Merphos | | 8.3 | U | 8.3 | 33 |
| Methyl parathion | | 5.4 | U | 5.4 | 17 |
| Mevinphos | | 11 | U | 11 | 66 |
| Monochrotophos | | 85 | U | 85 | 330 |
| Naled | | 5.2 | U | 5.2 | 330 |
| Phorate | | 11 | U | 11 | 33 |
| Ronnel | | 8.0 | U | 8.0 | 33 |
| Stirophos | | 8.9 | U | 8.9 | 33 |
| Sulfotepp | | 5.3 | U | 5.3 | 17 |
| Tokuthion | | 7.7 | U | 7.7 | 33 |
| Trichloronate | | 8.2 | U | 8.2 | 330 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 71 | | 35 - 134 |

**Client Sample ID:** **8A**

Lab Sample ID: 660-33863-3
Client Matrix: Solid

Date Sampled: 02/15/2010 1340
Date Received: 02/17/2010 0900

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### 8141A Organophosphorous Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-65935 | Instrument ID: | SGF |
| Preparation: | 3550B | Prep Batch: 640-65855 | Initial Weight/Volume: | 00030.38 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10.0 mL |
| Date Analyzed: | 02/24/2010 1614 | | Injection Volume: | 1 uL |
| Date Prepared: | 02/22/2010 1006 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Azinphos-methyl | | 4.3 | U | 4.3 | 65 |
| Bolstar | | 8.4 | U | 8.4 | 33 |
| Chlorpyrifos | | 8.3 | U | 8.3 | 33 |
| Coumaphos | | 8.5 | U | 8.5 | 330 |
| Demeton, Total | | 13 | U | 13 | 82 |
| Diazinon | | 8.7 | U | 8.7 | 33 |
| Dichlorvos | | 17 | U | 17 | 65 |
| Dimethoate | | 9.9 | U | 9.9 | 65 |
| Disulfoton | | 11 | U | 11 | 65 |
| EPN | | 9.0 | U | 9.0 | 33 |
| Ethoprop | | 15 | U | 15 | 17 |
| Ethyl Parathion | | 8.7 | U | 8.7 | 33 |
| Fensulfothion | | 9.9 | U | 9.9 | 330 |
| Hexazinone | | 7.6 | U | 7.6 | 33 |
| Malathion | | 8.9 | U | 8.9 | 33 |
| Merphos | | 8.2 | U | 8.2 | 33 |
| Methyl parathion | | 5.3 | U | 5.3 | 17 |
| Mevinphos | | 11 | U | 11 | 65 |
| Monochrotophos | | 84 | U | 84 | 330 |
| Naled | | 5.1 | U | 5.1 | 330 |
| Phorate | | 11 | U | 11 | 33 |
| Ronnel | | 7.9 | U | 7.9 | 33 |
| Stirophos | | 8.8 | U | 8.8 | 33 |
| Sulfotepp | | 5.2 | U | 5.2 | 17 |
| Tokuthion | | 7.6 | U | 7.6 | 33 |
| Trichloronate | | 8.1 | U | 8.1 | 330 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 69 | | 35 - 134 |

**Client Sample ID: 6B**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33863-4 | Date Sampled: | 02/15/2010 1400 |
| Client Matrix: | Solid | Date Received: | 02/17/2010 0900 |

### 8141A Organophosphorous Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-65935 | Instrument ID: | SGF |
| Preparation: | 3550B | Prep Batch: 640-65855 | Initial Weight/Volume: | 00030.04 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10.0 mL |
| Date Analyzed: | 02/24/2010 1629 | | Injection Volume: | 1 uL |
| Date Prepared: | 02/22/2010 1006 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Azinphos-methyl | | 4.4 | U | 4.4 | 66 |
| Bolstar | | 8.5 | U | 8.5 | 33 |
| Chlorpyrifos | | 8.4 | U | 8.4 | 33 |
| Coumaphos | | 8.6 | U | 8.6 | 330 |
| Demeton, Total | | 13 | U | 13 | 83 |
| Diazinon | | 8.8 | U | 8.8 | 33 |
| Dichlorvos | | 17 | U | 17 | 66 |
| Dimethoate | | 10 | U | 10 | 66 |
| Disulfoton | | 11 | U | 11 | 66 |
| EPN | | 9.1 | U | 9.1 | 33 |
| Ethoprop | | 15 | U | 15 | 17 |
| Ethyl Parathion | | 8.8 | U | 8.8 | 33 |
| Fensulfothion | | 10 | U | 10 | 330 |
| Hexazinone | | 7.7 | U | 7.7 | 33 |
| Malathion | | 9.0 | U | 9.0 | 33 |
| Merphos | | 8.3 | U | 8.3 | 33 |
| Methyl parathion | | 5.4 | U | 5.4 | 17 |
| Mevinphos | | 11 | U | 11 | 66 |
| Monochrotophos | | 85 | U | 85 | 330 |
| Naled | | 5.2 | U | 5.2 | 330 |
| Phorate | | 11 | U | 11 | 33 |
| Ronnel | | 8.0 | U | 8.0 | 33 |
| Stirophos | | 8.9 | U | 8.9 | 33 |
| Sulfotepp | | 5.3 | U | 5.3 | 17 |
| Tokuthion | | 7.7 | U | 7.7 | 33 |
| Trichloronate | | 8.2 | U | 8.2 | 330 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 68 | | 35 - 134 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Client Sample ID: 11A**

Lab Sample ID: 660-33863-5
Client Matrix: Water

Date Sampled: 02/15/2010 1010
Date Received: 02/17/2010 0900

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## 8141A Organophosphorous Pesticides (GC)

Method: 8141A
Preparation: 3520C
Dilution: 1.0
Date Analyzed: 02/23/2010 1729
Date Prepared: 02/18/2010 1430

Analysis Batch: 640-65935
Prep Batch: 640-65758

Instrument ID: SGF
Initial Weight/Volume: 1040 mL
Final Weight/Volume: 5.0 mL
Injection Volume: 1 uL
Result Type: PRIMARY

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Azinphos-methyl | 0.32 | U | 0.32 | 0.96 |
| Bolstar | 0.091 | U | 0.091 | 0.96 |
| Chlorpyrifos | 0.11 | U | 0.11 | 0.96 |
| Coumaphos | 0.078 | U | 0.078 | 0.96 |
| Demeton, Total | 0.14 | U | 0.14 | 2.4 |
| Diazinon | 0.11 | U | 0.11 | 0.96 |
| Dichlorvos | 0.25 | U J3 | 0.25 | 1.9 |
| Hexazinone | 0.15 | U | 0.15 | 1.9 |
| Dimethoate | 0.31 | U | 0.31 | 1.9 |
| Disulfoton | 0.12 | U | 0.12 | 1.9 |
| EPN | 0.068 | U | 0.068 | 0.96 |
| Ethoprop | 0.39 | U | 0.39 | 0.48 |
| Fensulfothion | 0.16 | U | 0.16 | 4.8 |
| Malathion | 0.088 | U | 0.088 | 0.96 |
| Merphos | 0.12 | U | 0.12 | 0.96 |
| Mevinphos | 0.14 | U | 0.14 | 1.9 |
| Monochrotophos | 2.5 | U J3 | 2.5 | 9.6 |
| Naled | 0.35 | U | 0.35 | 4.8 |
| Ethyl Parathion | 0.077 | U | 0.077 | 0.96 |
| Methyl parathion | 0.12 | U | 0.12 | 0.48 |
| Phorate | 0.15 | U | 0.15 | 0.96 |
| Ronnel | 0.12 | U | 0.12 | 0.96 |
| Sulfotepp | 0.053 | U | 0.053 | 0.48 |
| Stirophos | 0.081 | U | 0.081 | 0.96 |
| Tokuthion | 0.084 | U | 0.084 | 0.96 |
| Trichloronate | 0.11 | U | 0.11 | 0.96 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 104 | | 37 - 139 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Client Sample ID:** **8A**

Lab Sample ID: 660-33863-6
Client Matrix: Water

Date Sampled: 02/15/2010 1330
Date Received: 02/17/2010 0900

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## 8141A Organophosphorous Pesticides (GC)

Method: 8141A
Preparation: 3520C
Dilution: 1.0
Date Analyzed: 02/23/2010 1743
Date Prepared: 02/18/2010 1430

Analysis Batch: 640-65935
Prep Batch: 640-65758

Instrument ID: SGF
Initial Weight/Volume: 1040 mL
Final Weight/Volume: 5.0 mL
Injection Volume: 1 uL
Result Type: PRIMARY

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Azinphos-methyl | 0.32 | U | 0.32 | 0.96 |
| Bolstar | 0.091 | U | 0.091 | 0.96 |
| Chlorpyrifos | 0.11 | U | 0.11 | 0.96 |
| Coumaphos | 0.078 | U | 0.078 | 0.96 |
| Demeton, Total | 0.14 | U | 0.14 | 2.4 |
| Diazinon | 0.11 | U | 0.11 | 0.96 |
| Dichlorvos | 0.25 | U J3 | 0.25 | 1.9 |
| Hexazinone | 0.15 | U | 0.15 | 1.9 |
| Dimethoate | 0.31 | U | 0.31 | 1.9 |
| Disulfoton | 0.12 | U | 0.12 | 1.9 |
| EPN | 0.068 | U | 0.068 | 0.96 |
| Ethoprop | 0.39 | U | 0.39 | 0.48 |
| Fensulfothion | 0.16 | U | 0.16 | 4.8 |
| Malathion | 0.088 | U | 0.088 | 0.96 |
| Merphos | 0.12 | U | 0.12 | 0.96 |
| Mevinphos | 0.14 | U | 0.14 | 1.9 |
| Monochrotophos | 2.5 | U J3 | 2.5 | 9.6 |
| Naled | 0.35 | U | 0.35 | 4.8 |
| Ethyl Parathion | 0.077 | U | 0.077 | 0.96 |
| Methyl parathion | 0.12 | U | 0.12 | 0.48 |
| Phorate | 0.15 | U | 0.15 | 0.96 |
| Ronnel | 0.12 | U | 0.12 | 0.96 |
| Sulfotepp | 0.053 | U | 0.053 | 0.48 |
| Stirophos | 0.081 | U | 0.081 | 0.96 |
| Tokuthion | 0.084 | U | 0.084 | 0.96 |
| Trichloronate | 0.11 | U | 0.11 | 0.96 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 96 | | 37 - 139 |

**Client Sample ID:** **13**

|  |  |  |
|---|---|---|
| Lab Sample ID: | 660-33863-7 | Date Sampled: 02/15/2010 1100 |
| Client Matrix: | Water | Date Received: 02/17/2010 0900 |

---

### 8141A Organophosphorous Pesticides (GC)

|  |  |  |  |  |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-65935 | Instrument ID: | SGF |
| Preparation: | 3520C | Prep Batch: 640-65758 | Initial Weight/Volume: | 1000 mL |
| Dilution: | 1.0 |  | Final Weight/Volume: | 5.0 mL |
| Date Analyzed: | 02/23/2010 1757 |  | Injection Volume: | 1 uL |
| Date Prepared: | 02/18/2010 1430 |  | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Azinphos-methyl | 0.33 | U | 0.33 | 1.0 |
| Bolstar | 0.095 | U | 0.095 | 1.0 |
| Chlorpyrifos | 0.11 | U | 0.11 | 1.0 |
| Coumaphos | 0.081 | U | 0.081 | 1.0 |
| Demeton, Total | 0.15 | U | 0.15 | 2.5 |
| Diazinon | 0.11 | U | 0.11 | 1.0 |
| Dichlorvos | 0.26 | U J3 | 0.26 | 2.0 |
| Hexazinone | 0.16 | U | 0.16 | 2.0 |
| Dimethoate | 0.32 | U | 0.32 | 2.0 |
| Disulfoton | 0.12 | U | 0.12 | 2.0 |
| EPN | 0.071 | U | 0.071 | 1.0 |
| Ethoprop | 0.41 | U | 0.41 | 0.50 |
| Fensulfothion | 0.17 | U | 0.17 | 5.0 |
| Malathion | 0.092 | U | 0.092 | 1.0 |
| Merphos | 0.13 | U | 0.13 | 1.0 |
| Mevinphos | 0.15 | U | 0.15 | 2.0 |
| Monochrotophos | 2.6 | U J3 | 2.6 | 10 |
| Naled | 0.36 | U | 0.36 | 5.0 |
| Ethyl Parathion | 0.080 | U | 0.080 | 1.0 |
| Methyl parathion | 0.12 | U | 0.12 | 0.50 |
| Phorate | 0.16 | U | 0.16 | 1.0 |
| Ronnel | 0.13 | U | 0.13 | 1.0 |
| Sulfotepp | 0.055 | U | 0.055 | 0.50 |
| Stirophos | 0.084 | U | 0.084 | 1.0 |
| Tokuthion | 0.087 | U | 0.087 | 1.0 |
| Trichloronate | 0.11 | U | 0.11 | 1.0 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 103 |  | 37 - 139 |

**Client Sample ID:** **14**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33863-8 | Date Sampled: 02/15/2010 1140 |
| Client Matrix: | Water | Date Received: 02/17/2010 0900 |

### 8141A Organophosphorous Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-65935 | Instrument ID: | SGF |
| Preparation: | 3520C | Prep Batch: 640-65758 | Initial Weight/Volume: | 1060 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 5.0 mL |
| Date Analyzed: | 02/23/2010 1812 | | Injection Volume: | 1 uL |
| Date Prepared: | 02/18/2010 1430 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Azinphos-methyl | 0.31 | U | 0.31 | 0.94 |
| Bolstar | 0.090 | U | 0.090 | 0.94 |
| Chlorpyrifos | 0.10 | U | 0.10 | 0.94 |
| Coumaphos | 0.076 | U | 0.076 | 0.94 |
| Demeton, Total | 0.14 | U | 0.14 | 2.4 |
| Diazinon | 0.10 | U | 0.10 | 0.94 |
| Dichlorvos | 0.25 | U J3 | 0.25 | 1.9 |
| Hexazinone | 0.15 | U | 0.15 | 1.9 |
| Dimethoate | 0.30 | U | 0.30 | 1.9 |
| Disulfoton | 0.11 | U | 0.11 | 1.9 |
| EPN | 0.067 | U | 0.067 | 0.94 |
| Ethoprop | 0.39 | U | 0.39 | 0.47 |
| Fensulfothion | 0.16 | U | 0.16 | 4.7 |
| Malathion | 0.087 | U | 0.087 | 0.94 |
| Merphos | 0.12 | U | 0.12 | 0.94 |
| Mevinphos | 0.14 | U | 0.14 | 1.9 |
| Monochrotophos | 2.5 | U J3 | 2.5 | 9.4 |
| Naled | 0.34 | U | 0.34 | 4.7 |
| Ethyl Parathion | 0.075 | U | 0.075 | 0.94 |
| Methyl parathion | 0.11 | U | 0.11 | 0.47 |
| Phorate | 0.15 | U | 0.15 | 0.94 |
| Ronnel | 0.12 | U | 0.12 | 0.94 |
| Sulfotepp | 0.052 | U | 0.052 | 0.47 |
| Stirophos | 0.079 | U | 0.079 | 0.94 |
| Tokuthion | 0.082 | U | 0.082 | 0.94 |
| Trichloronate | 0.10 | U | 0.10 | 0.94 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 81 | | 37 - 139 |

**Client Sample ID: 12A**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33863-9 | Date Sampled: 02/15/2010 1350 |
| Client Matrix: | Water | Date Received: 02/17/2010 0900 |

### 8141A Organophosphorous Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-65935 | Instrument ID: | SGF |
| Preparation: | 3520C | Prep Batch: 640-65758 | Initial Weight/Volume: | 1060 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 5.0 mL |
| Date Analyzed: | 02/23/2010 1826 | | Injection Volume: | 1 uL |
| Date Prepared: | 02/18/2010 1430 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Azinphos-methyl | 0.31 | U | 0.31 | 0.94 |
| Bolstar | 0.090 | U | 0.090 | 0.94 |
| Chlorpyrifos | 0.10 | U | 0.10 | 0.94 |
| Coumaphos | 0.076 | U | 0.076 | 0.94 |
| Demeton, Total | 0.14 | U | 0.14 | 2.4 |
| Diazinon | 0.10 | U | 0.10 | 0.94 |
| Dichlorvos | 0.25 | U J3 | 0.25 | 1.9 |
| Hexazinone | 0.15 | U | 0.15 | 1.9 |
| Dimethoate | 0.30 | U | 0.30 | 1.9 |
| Disulfoton | 0.11 | U | 0.11 | 1.9 |
| EPN | 0.067 | U | 0.067 | 0.94 |
| Ethoprop | 0.39 | U | 0.39 | 0.47 |
| Fensulfothion | 0.16 | U | 0.16 | 4.7 |
| Malathion | 0.087 | U | 0.087 | 0.94 |
| Merphos | 0.12 | U | 0.12 | 0.94 |
| Mevinphos | 0.14 | U | 0.14 | 1.9 |
| Monochrotophos | 2.5 | U J3 | 2.5 | 9.4 |
| Naled | 0.34 | U | 0.34 | 4.7 |
| Ethyl Parathion | 0.075 | U | 0.075 | 0.94 |
| Methyl parathion | 0.11 | U | 0.11 | 0.47 |
| Phorate | 0.15 | U | 0.15 | 0.94 |
| Ronnel | 0.12 | U | 0.12 | 0.94 |
| Sulfotepp | 0.052 | U | 0.052 | 0.47 |
| Stirophos | 0.079 | U | 0.079 | 0.94 |
| Tokuthion | 0.082 | U | 0.082 | 0.94 |
| Trichloronate | 0.10 | U | 0.10 | 0.94 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 92 | | 37 - 139 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Client Sample ID:** **9A**

Lab Sample ID: 660-33863-10

Client Matrix: Water

Date Sampled: 02/15/2010 1250

Date Received: 02/17/2010 0900

## 8141A Organophosphorous Pesticides (GC)

Method: 8141A
Preparation: 3520C
Dilution: 1.0
Date Analyzed: 02/23/2010 1840
Date Prepared: 02/18/2010 1430

Analysis Batch: 640-65935
Prep Batch: 640-65758

Instrument ID: SGF
Initial Weight/Volume: 1060 mL
Final Weight/Volume: 5.0 mL
Injection Volume: 1 uL
Result Type: PRIMARY

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Azinphos-methyl | 0.31 | U | 0.31 | 0.94 |
| Bolstar | 0.090 | U | 0.090 | 0.94 |
| Chlorpyrifos | 0.10 | U | 0.10 | 0.94 |
| Coumaphos | 0.076 | U | 0.076 | 0.94 |
| Demeton, Total | 0.14 | U | 0.14 | 2.4 |
| Diazinon | 0.10 | U | 0.10 | 0.94 |
| Dichlorvos | 0.25 | U J3 | 0.25 | 1.9 |
| Hexazinone | 0.15 | U | 0.15 | 1.9 |
| Dimethoate | 0.30 | U | 0.30 | 1.9 |
| Disulfoton | 0.11 | U | 0.11 | 1.9 |
| EPN | 0.067 | U | 0.067 | 0.94 |
| Ethoprop | 0.39 | U | 0.39 | 0.47 |
| Fensulfothion | 0.16 | U | 0.16 | 4.7 |
| Malathion | 0.087 | U | 0.087 | 0.94 |
| Merphos | 0.12 | U | 0.12 | 0.94 |
| Mevinphos | 0.14 | U | 0.14 | 1.9 |
| Monochrotophos | 2.5 | U J3 | 2.5 | 9.4 |
| Naled | 0.34 | U | 0.34 | 4.7 |
| Ethyl Parathion | 0.075 | U | 0.075 | 0.94 |
| Methyl parathion | 0.11 | U | 0.11 | 0.47 |
| Phorate | 0.15 | U | 0.15 | 0.94 |
| Ronnel | 0.12 | U | 0.12 | 0.94 |
| Sulfotepp | 0.052 | U | 0.052 | 0.47 |
| Stirophos | 0.079 | U | 0.079 | 0.94 |
| Tokuthion | 0.082 | U | 0.082 | 0.94 |
| Trichloronate | 0.10 | U | 0.10 | 0.94 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 79 |  | 37 - 139 |

**Client Sample ID: 6B**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33863-11 | Date Sampled: | 02/15/2010 1450 |
| Client Matrix: | Water | Date Received: | 02/17/2010 0900 |

### 8141A Organophosphorous Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-65935 | Instrument ID: | SGF |
| Preparation: | 3520C | Prep Batch: 640-65758 | Initial Weight/Volume: | 1040 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 5.0 mL |
| Date Analyzed: | 02/23/2010 1854 | | Injection Volume: | 1 uL |
| Date Prepared: | 02/18/2010 1430 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Azinphos-methyl | 0.32 | U | 0.32 | 0.96 |
| Bolstar | 0.091 | U | 0.091 | 0.96 |
| Chlorpyrifos | 0.11 | U | 0.11 | 0.96 |
| Coumaphos | 0.078 | U | 0.078 | 0.96 |
| Demeton, Total | 0.14 | U | 0.14 | 2.4 |
| Diazinon | 0.11 | U | 0.11 | 0.96 |
| Dichlorvos | 0.25 | U J3 | 0.25 | 1.9 |
| Hexazinone | 0.15 | U | 0.15 | 1.9 |
| Dimethoate | 0.31 | U | 0.31 | 1.9 |
| Disulfoton | 0.12 | U | 0.12 | 1.9 |
| EPN | 0.068 | U | 0.068 | 0.96 |
| Ethoprop | 0.39 | U | 0.39 | 0.48 |
| Fensulfothion | 0.16 | U | 0.16 | 4.8 |
| Malathion | 0.088 | U | 0.088 | 0.96 |
| Merphos | 0.12 | U | 0.12 | 0.96 |
| Mevinphos | 0.14 | U | 0.14 | 1.9 |
| Monochrotophos | 2.5 | U J3 | 2.5 | 9.6 |
| Naled | 0.35 | U | 0.35 | 4.8 |
| Ethyl Parathion | 0.077 | U | 0.077 | 0.96 |
| Methyl parathion | 0.12 | U | 0.12 | 0.48 |
| Phorate | 0.15 | U | 0.15 | 0.96 |
| Ronnel | 0.12 | U | 0.12 | 0.96 |
| Sulfotepp | 0.053 | U | 0.053 | 0.48 |
| Stirophos | 0.081 | U | 0.081 | 0.96 |
| Tokuthion | 0.084 | U | 0.084 | 0.96 |
| Trichloronate | 0.11 | U | 0.11 | 0.96 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 78 | | 37 - 139 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Client Sample ID:** **11A**

Lab Sample ID: 660-33863-1

Client Matrix: Solid

Date Sampled: 02/15/2010 1020

Date Received: 02/17/2010 0900

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## 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91251 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-90805 | Initial Weight/Volume: | 30.23 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/26/2010 0945 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/18/2010 1200 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| 2,4,5-T | | 9.9 | U | 9.9 | 50 |
| 2,4-D | | 1.6 | U | 1.6 | 8.2 |
| 2,4-DB | | 6.4 | U | 6.4 | 8.2 |
| Dalapon | | 23 | U | 23 | 2000 |
| Dicamba | | 12 | U | 12 | 50 |
| Dichlorprop | | 25 | U | 25 | 99 |
| Dinoseb | | 8.2 | U | 8.2 | 30 |
| MCPA | | 730 | U | 730 | 2000 |
| MCPP | | 400 | U | 400 | 2000 |
| Pentachlorophenol | | 5.0 | U | 5.0 | 17 |
| Picloram | | 1.2 | U | 1.2 | 3.3 |
| Silvex (2,4,5-TP) | | 9.9 | U | 9.9 | 50 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 1980 | L J1 | 10 - 135 |

**Client Sample ID:** **13**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33863-2 | Date Sampled: | 02/15/2010 1110 |
| Client Matrix: | Solid | Date Received: | 02/17/2010 0900 |

### 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91251 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-90805 | Initial Weight/Volume: | 29.80 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/26/2010 1002 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/18/2010 1200 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| 2,4,5-T | | 10 | U | 10 | 50 |
| 2,4-D | | 1.6 | U | 1.6 | 8.4 |
| 2,4-DB | | 6.4 | U | 6.4 | 8.4 |
| Dalapon | | 23 | U | 23 | 2000 |
| Dicamba | | 12 | U | 12 | 50 |
| Dichlorprop | | 25 | U | 25 | 100 |
| Dinoseb | | 8.4 | U | 8.4 | 30 |
| MCPA | | 740 | U | 740 | 2000 |
| MCPP | | 400 | U | 400 | 2000 |
| Pentachlorophenol | | 5.0 | U | 5.0 | 17 |
| Picloram | | 1.2 | U | 1.2 | 3.3 |
| Silvex (2,4,5-TP) | | 10 | U | 10 | 50 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 167 | J1 | 10 - 135 |

## Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Client Sample ID:** **8A**

Lab Sample ID: 660-33863-3

Client Matrix: Solid

Date Sampled: 02/15/2010 1340

Date Received: 02/17/2010 0900

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### 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91251 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-90805 | Initial Weight/Volume: | 29.91 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/26/2010 1020 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/18/2010 1200 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| 2,4,5-T | | 10 | U | 10 | 50 |
| 2,4-D | | 1.6 | U | 1.6 | 8.3 |
| 2,4-DB | | 6.4 | U | 6.4 | 8.3 |
| Dalapon | | 23 | U | 23 | 2000 |
| Dicamba | | 12 | U | 12 | 50 |
| Dichlorprop | | 25 | U | 25 | 100 |
| Dinoseb | | 8.3 | U | 8.3 | 30 |
| MCPA | | 740 | U | 740 | 2000 |
| MCPP | | 400 | U | 400 | 2000 |
| Pentachlorophenol | | 5.0 | U | 5.0 | 17 |
| Picloram | | 1.2 | U | 1.2 | 3.3 |
| Silvex (2,4,5-TP) | | 10 | U | 10 | 50 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 95 | | 10 - 135 |

**Client Sample ID: 6B**

Lab Sample ID: 660-33863-4
Client Matrix: Solid

Date Sampled: 02/15/2010 1400
Date Received: 02/17/2010 0900

### 8151A Herbicides (GC)

Method: 8151A
Preparation: 8151A
Dilution: 1.0
Date Analyzed: 02/26/2010 1037
Date Prepared: 02/18/2010 1200

Analysis Batch: 660-91251
Prep Batch: 660-90805

Instrument ID: BSGJ
Initial Weight/Volume: 29.57 g
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Result Type: PRIMARY

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| 2,4,5-T | | 10 | U | 10 | 51 |
| 2,4-D | | 1.6 | U J3 | 1.6 | 8.4 |
| 2,4-DB | | 6.5 | U | 6.5 | 8.4 |
| Dalapon | | 23 | U | 23 | 2000 |
| Dicamba | | 12 | U | 12 | 51 |
| Dichlorprop | | 25 | U | 25 | 100 |
| Dinoseb | | 8.4 | U | 8.4 | 30 |
| MCPA | | 750 | U | 750 | 2000 |
| MCPP | | 410 | U | 410 | 2000 |
| Pentachlorophenol | | 5.1 | U | 5.1 | 17 |
| Picloram | | 1.2 | U J3 | 1.2 | 3.3 |
| Silvex (2,4,5-TP) | | 10 | U | 10 | 51 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 510 | L J1 | 10 - 135 |

**Client Sample ID:** **11A**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33863-5 | Date Sampled: 02/15/2010 1010 |
| Client Matrix: | Water | Date Received: 02/17/2010 0900 |

### 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91375 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-90939 | Initial Weight/Volume: | 1040 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/26/2010 0541 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 1412 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 2,4,5-T | 0.96 | U | 0.96 | 4.8 |
| 2,4-D | 0.96 | U | 0.96 | 4.8 |
| 2,4-DB | 0.96 | U | 0.96 | 4.8 |
| Dalapon | 24 | U | 24 | 120 |
| Dicamba | 0.24 | U | 0.24 | 1.2 |
| Dichlorprop | 0.96 | U | 0.96 | 5.8 |
| Dinoseb | 0.96 | U | 0.96 | 5.8 |
| MCPA | 33 | U | 33 | 120 |
| MCPP | 34 | U | 34 | 120 |
| Pentachlorophenol | 0.082 | U | 0.082 | 0.96 |
| Picloram | 0.96 | U | 0.96 | 4.8 |
| Silvex (2,4,5-TP) | 0.96 | U | 0.96 | 4.8 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 85 | | 33 - 120 |

**Client Sample ID:** **8A**

Lab Sample ID: 660-33863-6 Date Sampled: 02/15/2010 1330
Client Matrix: Water Date Received: 02/17/2010 0900

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### 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91375 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-90939 | Initial Weight/Volume: | 1055 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/26/2010 0558 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 1412 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 2,4,5-T | 0.95 | U | 0.95 | 4.7 |
| 2,4-D | 0.95 | U | 0.95 | 4.7 |
| 2,4-DB | 0.95 | U | 0.95 | 4.7 |
| Dalapon | 24 | U | 24 | 110 |
| Dicamba | 0.24 | U | 0.24 | 1.1 |
| Dichlorprop | 0.95 | U | 0.95 | 5.7 |
| Dinoseb | 0.95 | U | 0.95 | 5.7 |
| MCPA | 32 | U | 32 | 110 |
| MCPP | 33 | U | 33 | 110 |
| Pentachlorophenol | 0.081 | U | 0.081 | 0.95 |
| Picloram | 0.95 | U | 0.95 | 4.7 |
| Silvex (2,4,5-TP) | 0.95 | U | 0.95 | 4.7 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 94 | | 33 - 120 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Client Sample ID: 13**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33863-7 | Date Sampled: | 02/15/2010 1100 |
| Client Matrix: | Water | Date Received: | 02/17/2010 0900 |

### 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91375 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-90939 | Initial Weight/Volume: | 990 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/26/2010 0616 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 1412 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 2,4,5-T | 1.0 | U | 1.0 | 5.1 |
| 2,4-D | 1.0 | U | 1.0 | 5.1 |
| 2,4-DB | 1.0 | U | 1.0 | 5.1 |
| Dalapon | 25 | U | 25 | 120 |
| Dicamba | 0.25 | U | 0.25 | 1.2 |
| Dichlorprop | 1.0 | U | 1.0 | 6.1 |
| Dinoseb | 1.0 | U | 1.0 | 6.1 |
| MCPA | 34 | U | 34 | 120 |
| MCPP | 35 | U | 35 | 120 |
| Pentachlorophenol | 0.086 | U | 0.086 | 1.0 |
| Picloram | 1.0 | U | 1.0 | 5.1 |
| Silvex (2,4,5-TP) | 1.0 | U | 1.0 | 5.1 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 84 | | 33 - 120 |

**Client Sample ID: 14**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33863-8 | Date Sampled: | 02/15/2010 1140 |
| Client Matrix: | Water | Date Received: | 02/17/2010 0900 |

## 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91375 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-90939 | Initial Weight/Volume: | 1050 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/26/2010 0633 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 1412 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 2,4,5-T | 0.95 | U | 0.95 | 4.8 |
| 2,4-D | 0.95 | U | 0.95 | 4.8 |
| 2,4-DB | 0.95 | U | 0.95 | 4.8 |
| Dalapon | 24 | U | 24 | 110 |
| Dicamba | 0.24 | U | 0.24 | 1.1 |
| Dichlorprop | 0.95 | U | 0.95 | 5.7 |
| Dinoseb | 0.95 | U | 0.95 | 5.7 |
| MCPA | 32 | U | 32 | 110 |
| MCPP | 33 | U | 33 | 110 |
| Pentachlorophenol | 0.081 | U | 0.081 | 0.95 |
| Picloram | 0.95 | U | 0.95 | 4.8 |
| Silvex (2,4,5-TP) | 0.95 | U | 0.95 | 4.8 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 95 | | 33 - 120 |

**Client Sample ID:** **12A**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33863-9 | Date Sampled: 02/15/2010 1350 |
| Client Matrix: | Water | Date Received: 02/17/2010 0900 |

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### 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91375 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-90939 | Initial Weight/Volume: | 1050 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/26/2010 0650 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 1412 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 2,4,5-T | 0.95 | U | 0.95 | 4.8 |
| 2,4-D | 0.95 | U | 0.95 | 4.8 |
| 2,4-DB | 0.95 | U | 0.95 | 4.8 |
| Dalapon | 24 | U | 24 | 110 |
| Dicamba | 0.24 | U | 0.24 | 1.1 |
| Dichlorprop | 0.95 | U | 0.95 | 5.7 |
| Dinoseb | 0.95 | U | 0.95 | 5.7 |
| MCPA | 32 | U | 32 | 110 |
| MCPP | 33 | U | 33 | 110 |
| Pentachlorophenol | 0.081 | U | 0.081 | 0.95 |
| Picloram | 0.95 | U | 0.95 | 4.8 |
| Silvex (2,4,5-TP) | 0.95 | U | 0.95 | 4.8 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 86 | | 33 - 120 |

**Client Sample ID: 9A**

|  |  |  |
|---|---|---|
| Lab Sample ID: | 660-33863-10 | Date Sampled: 02/15/2010 1250 |
| Client Matrix: | Water | Date Received: 02/17/2010 0900 |

### 8151A Herbicides (GC)

|  |  |  |  |  |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91375 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-90939 | Initial Weight/Volume: | 1030 mL |
| Dilution: | 1.0 |  | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/26/2010 0707 |  | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 1412 |  | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 2,4,5-T | 0.97 | U | 0.97 | 4.9 |
| 2,4-D | 0.97 | U | 0.97 | 4.9 |
| 2,4-DB | 0.97 | U | 0.97 | 4.9 |
| Dalapon | 24 | U | 24 | 120 |
| Dicamba | 0.24 | U | 0.24 | 1.2 |
| Dichlorprop | 0.97 | U | 0.97 | 5.8 |
| Dinoseb | 0.97 | U | 0.97 | 5.8 |
| MCPA | 33 | U | 33 | 120 |
| MCPP | 34 | U | 34 | 120 |
| Pentachlorophenol | 0.083 | U | 0.083 | 0.97 |
| Picloram | 0.97 | U | 0.97 | 4.9 |
| Silvex (2,4,5-TP) | 0.97 | U | 0.97 | 4.9 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 100 |  | 33 - 120 |

**Client Sample ID: 6B**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33863-11 | Date Sampled: 02/15/2010 1450 |
| Client Matrix: | Water | Date Received: 02/17/2010 0900 |

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## 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91375 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-90939 | Initial Weight/Volume: | 1050 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/26/2010 0724 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 1412 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 2,4,5-T | 0.95 | U | 0.95 | 4.8 |
| 2,4-D | 0.95 | U | 0.95 | 4.8 |
| 2,4-DB | 0.95 | U | 0.95 | 4.8 |
| Dalapon | 24 | U | 24 | 110 |
| Dicamba | 0.24 | U | 0.24 | 1.1 |
| Dichlorprop | 0.95 | U | 0.95 | 5.7 |
| Dinoseb | 0.95 | U | 0.95 | 5.7 |
| MCPA | 32 | U | 32 | 110 |
| MCPP | 33 | U | 33 | 110 |
| Pentachlorophenol | 0.081 | U | 0.081 | 0.95 |
| Picloram | 0.95 | U | 0.95 | 4.8 |
| Silvex (2,4,5-TP) | 0.95 | U | 0.95 | 4.8 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 98 | | 33 - 120 |

## Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Client Sample ID:** **11A**

Lab Sample ID: 660-33863-1
Client Matrix: Solid

Date Sampled: 02/15/2010 1020
Date Received: 02/17/2010 0900

### 6010B Metals (ICP)

Method: 6010B
Preparation: 3050B
Dilution: 1.0
Date Analyzed: 02/19/2010 1602
Date Prepared: 02/18/2010 1533

Analysis Batch: 660-90852
Prep Batch: 660-90828

Instrument ID: ICPA
Lab File ID: 10B19A
Initial Weight/Volume: 1.02 g
Final Weight/Volume: 50 mL

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Aluminum | | 1700 | | 5.7 | 20 |
| Arsenic | | 0.72 | | 0.23 | 0.49 |
| Boron | | 8.4 | | 0.58 | 4.9 |
| Barium | | 6.3 | | 0.16 | 0.98 |
| Cadmium | | 0.085 | U | 0.085 | 0.49 |
| Cobalt | | 0.44 | I | 0.19 | 0.98 |
| Chromium | | 2.8 | | 0.17 | 0.98 |
| Copper | | 9.8 | | 0.49 | 2.0 |
| Iron | | 1400 | | 2.9 | 4.9 |
| Magnesium | | 2300 | | 6.7 | 49 |
| Manganese | | 28 | | 0.21 | 0.98 |
| Sodium | | 880 | | 18 | 49 |
| Lead | | 18 | | 0.15 | 0.49 |
| Titanium | | 30 | | 0.29 | 0.98 |
| Vanadium | | 3.2 | | 0.11 | 0.98 |
| Zinc | | 29 | | 0.49 | 2.0 |

Method: 6010B
Preparation: 3050B
Dilution: 10
Date Analyzed: 02/19/2010 1717
Date Prepared: 02/18/2010 1533

Analysis Batch: 660-90852
Prep Batch: 660-90828

Instrument ID: ICPA
Lab File ID: 10B19A
Initial Weight/Volume: 1.02 g
Final Weight/Volume: 50 mL

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Calcium | | 82000 | | 150 | 490 |
| Strontium | | 1100 | | 0.96 | 9.8 |

### 7471A Mercury (CVAA)

Method: 7471A
Preparation: 7471A
Dilution: 1.0
Date Analyzed: 03/04/2010 1455
Date Prepared: 03/04/2010 1100

Analysis Batch: 660-91412
Prep Batch: 660-91390

Instrument ID: PS200II
Lab File ID: N/A
Initial Weight/Volume: 0.30 g
Final Weight/Volume: 50 mL

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Mercury | | 0.024 | | 0.0075 | 0.020 |

# Analytical Data

Client: Environmental Engineering Consultant  Job Number: 660-33863-1

**Client Sample ID:** **13**

Lab Sample ID: 660-33863-2  Date Sampled: 02/15/2010 1110
Client Matrix: Solid  Date Received: 02/17/2010 0900

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## 6010B Metals (ICP)

| | | | | | |
|---|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-90852 | | Instrument ID: | ICPA |
| Preparation: | 3050B | Prep Batch: 660-90828 | | Lab File ID: | 10B19A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 1.03 g |
| Date Analyzed: | 02/19/2010 1608 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/18/2010 1533 | | | | |

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Aluminum | | 4200 | | 5.6 | 19 |
| Arsenic | | 0.57 | | 0.22 | 0.49 |
| Boron | | 4.4 | I | 0.57 | 4.9 |
| Barium | | 19 | | 0.16 | 0.97 |
| Cadmium | | 0.097 | I | 0.084 | 0.49 |
| Cobalt | | 0.83 | I | 0.18 | 0.97 |
| Chromium | | 4.2 | | 0.17 | 0.97 |
| Copper | | 6.0 | | 0.49 | 1.9 |
| Iron | | 2500 | | 2.9 | 4.9 |
| Magnesium | | 2100 | | 6.6 | 49 |
| Manganese | | 53 | | 0.20 | 0.97 |
| Sodium | | 430 | | 17 | 49 |
| Lead | | 5.4 | | 0.15 | 0.49 |
| Titanium | | 43 | | 0.29 | 0.97 |
| Vanadium | | 6.4 | | 0.11 | 0.97 |
| Zinc | | 21 | | 0.49 | 1.9 |

| | | | | | |
|---|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-90852 | | Instrument ID: | ICPA |
| Preparation: | 3050B | Prep Batch: 660-90828 | | Lab File ID: | 10B19A |
| Dilution: | 10 | | | Initial Weight/Volume: | 1.03 g |
| Date Analyzed: | 02/19/2010 1723 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/18/2010 1533 | | | | |

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Calcium | | 60000 | | 150 | 490 |

| | | | | | |
|---|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-90964 | | Instrument ID: | ICPA |
| Preparation: | 3050B | Prep Batch: 660-90828 | | Lab File ID: | 10B22A |
| Dilution: | 40 | | | Initial Weight/Volume: | 1.03 g |
| Date Analyzed: | 02/22/2010 1218 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/18/2010 1533 | | | | |

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Strontium | | 3100 | | 3.8 | 39 |

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## 7471A Mercury (CVAA)

| | | | | | |
|---|---|---|---|---|---|
| Method: | 7471A | Analysis Batch: 660-91412 | | Instrument ID: | PS200II |
| Preparation: | 7471A | Prep Batch: 660-91390 | | Lab File ID: | N/A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 0.32 g |
| Date Analyzed: | 03/04/2010 1457 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 03/04/2010 1100 | | | | |

**Client Sample ID:** **13**

Lab Sample ID: 660-33863-2
Client Matrix: Solid

Date Sampled: 02/15/2010 1110
Date Received: 02/17/2010 0900

### 7471A Mercury (CVAA)

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Mercury | | 0.023 | | 0.0070 | 0.019 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Client Sample ID:** **8A**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33863-3 | Date Sampled: | 02/15/2010 1340 |
| Client Matrix: | Solid | Date Received: | 02/17/2010 0900 |

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## 6010B Metals (ICP)

| | | | | |
|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-90852 | Instrument ID: | ICPA |
| Preparation: | 3050B | Prep Batch: 660-90828 | Lab File ID: | 10B19A |
| Dilution: | 1.0 | | Initial Weight/Volume: | 1.04 g |
| Date Analyzed: | 02/19/2010 1614 | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/18/2010 1533 | | | |

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Aluminum | | 410 | | 5.6 | 19 |
| Arsenic | | 0.22 | U | 0.22 | 0.48 |
| Boron | | 11 | | 0.57 | 4.8 |
| Barium | | 2.0 | | 0.15 | 0.96 |
| Cadmium | | 0.084 | U | 0.084 | 0.48 |
| Cobalt | | 0.18 | U | 0.18 | 0.96 |
| Chromium | | 1.0 | | 0.16 | 0.96 |
| Copper | | 1.7 | I | 0.48 | 1.9 |
| Iron | | 280 | | 2.9 | 4.8 |
| Magnesium | | 1600 | | 6.5 | 48 |
| Manganese | | 6.0 | | 0.20 | 0.96 |
| Sodium | | 620 | | 17 | 48 |
| Lead | | 3.1 | | 0.14 | 0.48 |
| Titanium | | 4.6 | | 0.29 | 0.96 |
| Vanadium | | 2.1 | | 0.11 | 0.96 |
| Zinc | | 3.9 | | 0.48 | 1.9 |

| | | | | |
|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-90852 | Instrument ID: | ICPA |
| Preparation: | 3050B | Prep Batch: 660-90828 | Lab File ID: | 10B19A |
| Dilution: | 10 | | Initial Weight/Volume: | 1.04 g |
| Date Analyzed: | 02/19/2010 1729 | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/18/2010 1533 | | | |

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Calcium | | 41000 | | 140 | 480 |
| Strontium | | 630 | | 0.94 | 9.6 |

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## 7471A Mercury (CVAA)

| | | | | |
|---|---|---|---|---|
| Method: | 7471A | Analysis Batch: 660-91412 | Instrument ID: | PS200II |
| Preparation: | 7471A | Prep Batch: 660-91390 | Lab File ID: | N/A |
| Dilution: | 1.0 | | Initial Weight/Volume: | 0.32 g |
| Date Analyzed: | 03/04/2010 1500 | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 03/04/2010 1100 | | | |

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Mercury | | 0.0093 | I | 0.0070 | 0.019 |

**Client Sample ID:** **6B**

Lab Sample ID: 660-33863-4
Client Matrix: Solid

Date Sampled: 02/15/2010 1400
Date Received: 02/17/2010 0900

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### 6010B Metals (ICP)

| | | | | |
|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-90852 | Instrument ID: | ICPA |
| Preparation: | 3050B | Prep Batch: 660-90828 | Lab File ID: | 10B19A |
| Dilution: | 1.0 | | Initial Weight/Volume: | 1.01 g |
| Date Analyzed: | 02/19/2010 1632 | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/18/2010 1533 | | | |

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Aluminum | | 2000 | | 5.7 | 20 |
| Arsenic | | 0.33 | I | 0.23 | 0.50 |
| Boron | | 10 | | 0.58 | 5.0 |
| Barium | | 9.6 | | 0.16 | 0.99 |
| Cadmium | | 0.086 | U | 0.086 | 0.50 |
| Cobalt | | 0.37 | I | 0.19 | 0.99 |
| Chromium | | 1.8 | | 0.17 | 0.99 |
| Copper | | 5.5 | | 0.50 | 2.0 |
| Iron | | 1100 | | 3.0 | 5.0 |
| Magnesium | | 1900 | | 6.7 | 50 |
| Manganese | | 30 | | 0.21 | 0.99 |
| Sodium | | 1400 | | 18 | 50 |
| Lead | | 14 | | 0.15 | 0.50 |
| Titanium | | 20 | | 0.30 | 0.99 |
| Vanadium | | 3.1 | | 0.11 | 0.99 |
| Zinc | | 8.9 | | 0.50 | 2.0 |

| | | | | |
|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-90852 | Instrument ID: | ICPA |
| Preparation: | 3050B | Prep Batch: 660-90828 | Lab File ID: | 10B19A |
| Dilution: | 10 | | Initial Weight/Volume: | 1.01 g |
| Date Analyzed: | 02/19/2010 1735 | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/18/2010 1533 | | | |

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Calcium | | 110000 | | 150 | 500 |

| | | | | |
|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-90964 | Instrument ID: | ICPA |
| Preparation: | 3050B | Prep Batch: 660-90828 | Lab File ID: | 10B22A |
| Dilution: | 40 | | Initial Weight/Volume: | 1.01 g |
| Date Analyzed: | 02/22/2010 1224 | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/18/2010 1533 | | | |

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Strontium | | 2500 | | 3.9 | 40 |

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### 7471A Mercury (CVAA)

| | | | | |
|---|---|---|---|---|
| Method: | 7471A | Analysis Batch: 660-91412 | Instrument ID: | PS200II |
| Preparation: | 7471A | Prep Batch: 660-91390 | Lab File ID: | N/A |
| Dilution: | 1.0 | | Initial Weight/Volume: | 0.30 g |
| Date Analyzed: | 03/04/2010 1502 | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 03/04/2010 1100 | | | |

**Client Sample ID:** **6B**

Lab Sample ID: 660-33863-4
Client Matrix: Solid

Date Sampled: 02/15/2010 1400
Date Received: 02/17/2010 0900

### 7471A Mercury (CVAA)

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Mercury | | 0.014 | I | 0.0075 | 0.020 |

**Client Sample ID:** **11A**

Lab Sample ID: 660-33863-5
Client Matrix: Water

Date Sampled: 02/15/2010 1010
Date Received: 02/17/2010 0900

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### 6010B Metals (ICP)-Total Recoverable

| | | | | |
|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-91239 | Instrument ID: | ICPA |
| Preparation: | 3005A | Prep Batch: 660-90946 | Lab File ID: | 10C01A |
| Dilution: | 1.0 | | Initial Weight/Volume: | 50 mL |
| Date Analyzed: | 03/01/2010 1628 | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/22/2010 1600 | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Copper | 0.0029 | U | 0.0029 | 0.010 |
| Iron | 0.24 | | 0.050 | 0.20 |
| Potassium | 41 | | 0.19 | 1.0 |
| Magnesium | 80 | | 0.020 | 0.080 |
| Lead | 0.0020 | U | 0.0020 | 0.010 |
| Zinc | 0.014 | I | 0.0050 | 0.020 |

| | | | | |
|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-91239 | Instrument ID: | ICPA |
| Preparation: | 3005A | Prep Batch: 660-90946 | Lab File ID: | 10C01A |
| Dilution: | 20 | | Initial Weight/Volume: | 50 mL |
| Date Analyzed: | 03/01/2010 1915 | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/22/2010 1600 | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Sodium | 570 | | 6.2 | 10 |

---

### 7470A Mercury

| | | | | |
|---|---|---|---|---|
| Method: | 7470A | Analysis Batch: 660-90825 | Instrument ID: | PS200II |
| Preparation: | 7470A | Prep Batch: 660-90800 | Lab File ID: | N/A |
| Dilution: | 1.0 | | Initial Weight/Volume: | 25 mL |
| Date Analyzed: | 02/18/2010 1340 | | Final Weight/Volume: | 25 mL |
| Date Prepared: | 02/18/2010 0900 | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Mercury | 0.000072 | U | 0.000072 | 0.00020 |

**Client Sample ID:** **8A**

Lab Sample ID: 660-33863-6
Client Matrix: Water

Date Sampled: 02/15/2010 1330
Date Received: 02/17/2010 0900

### 6010B Metals (ICP)-Total Recoverable

| | | | | | |
|---|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-91239 | | Instrument ID: | ICPA |
| Preparation: | 3005A | Prep Batch: 660-90946 | | Lab File ID: | 10C01A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 50 mL |
| Date Analyzed: | 03/01/2010 1634 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/22/2010 1600 | | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Copper | 0.0029 | U | 0.0029 | 0.010 |
| Iron | 0.052 | I | 0.050 | 0.20 |
| Potassium | 21 | | 0.19 | 1.0 |
| Magnesium | 47 | | 0.020 | 0.080 |
| Lead | 0.0020 | U | 0.0020 | 0.010 |
| Zinc | 0.0076 | I | 0.0050 | 0.020 |

| | | | | | |
|---|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-91239 | | Instrument ID: | ICPA |
| Preparation: | 3005A | Prep Batch: 660-90946 | | Lab File ID: | 10C01A |
| Dilution: | 20 | | | Initial Weight/Volume: | 50 mL |
| Date Analyzed: | 03/01/2010 1921 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/22/2010 1600 | | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Sodium | 280 | | 6.2 | 10 |

### 7470A Mercury

| | | | | | |
|---|---|---|---|---|---|
| Method: | 7470A | Analysis Batch: 660-90825 | | Instrument ID: | PS200II |
| Preparation: | 7470A | Prep Batch: 660-90800 | | Lab File ID: | N/A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 25 mL |
| Date Analyzed: | 02/18/2010 1333 | | | Final Weight/Volume: | 25 mL |
| Date Prepared: | 02/18/2010 0900 | | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Mercury | 0.000072 | U | 0.000072 | 0.00020 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Client Sample ID:** **13**

Lab Sample ID: 660-33863-7
Client Matrix: Water

Date Sampled: 02/15/2010 1100
Date Received: 02/17/2010 0900

## 6010B Metals (ICP)-Total Recoverable

Method: 6010B
Preparation: 3005A
Dilution: 1.0
Date Analyzed: 03/01/2010 1640
Date Prepared: 02/22/2010 1600

Analysis Batch: 660-91239
Prep Batch: 660-90946

Instrument ID: ICPA
Lab File ID: 10C01A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Copper | 0.0029 | U | 0.0029 | 0.010 |
| Iron | 0.34 | | 0.050 | 0.20 |
| Potassium | 11 | | 0.19 | 1.0 |
| Magnesium | 42 | | 0.020 | 0.080 |
| Lead | 0.0020 | U | 0.0020 | 0.010 |
| Zinc | 0.018 | I | 0.0050 | 0.020 |

Method: 6010B
Preparation: 3005A
Dilution: 20
Date Analyzed: 03/01/2010 1927
Date Prepared: 02/22/2010 1600

Analysis Batch: 660-91239
Prep Batch: 660-90946

Instrument ID: ICPA
Lab File ID: 10C01A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Sodium | 110 | | 6.2 | 10 |

## 7470A Mercury

Method: 7470A
Preparation: 7470A
Dilution: 1.0
Date Analyzed: 02/18/2010 1343
Date Prepared: 02/18/2010 0900

Analysis Batch: 660-90825
Prep Batch: 660-90800

Instrument ID: PS200II
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Mercury | 0.000072 | U | 0.000072 | 0.00020 |

**Client Sample ID:** **14**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33863-8 | Date Sampled: 02/15/2010 1140 |
| Client Matrix: | Water | Date Received: 02/17/2010 0900 |

### 6010B Metals (ICP)-Total Recoverable

| | | | | |
|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-91239 | Instrument ID: | ICPA |
| Preparation: | 3005A | Prep Batch: 660-90946 | Lab File ID: | 10C01A |
| Dilution: | 1.0 | | Initial Weight/Volume: | 50 mL |
| Date Analyzed: | 03/01/2010 1701 | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/22/2010 1600 | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Copper | 0.0029 | U | 0.0029 | 0.010 |
| Iron | 0.33 | | 0.050 | 0.20 |
| Potassium | 20 | | 0.19 | 1.0 |
| Magnesium | 53 | | 0.020 | 0.080 |
| Lead | 0.0020 | U | 0.0020 | 0.010 |
| Zinc | 0.030 | | 0.0050 | 0.020 |

| | | | | |
|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-91239 | Instrument ID: | ICPA |
| Preparation: | 3005A | Prep Batch: 660-90946 | Lab File ID: | 10C01A |
| Dilution: | 20 | | Initial Weight/Volume: | 50 mL |
| Date Analyzed: | 03/01/2010 1933 | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/22/2010 1600 | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Sodium | 210 | | 6.2 | 10 |

### 7470A Mercury

| | | | | |
|---|---|---|---|---|
| Method: | 7470A | Analysis Batch: 660-90825 | Instrument ID: | PS200II |
| Preparation: | 7470A | Prep Batch: 660-90800 | Lab File ID: | N/A |
| Dilution: | 1.0 | | Initial Weight/Volume: | 25 mL |
| Date Analyzed: | 02/18/2010 1345 | | Final Weight/Volume: | 25 mL |
| Date Prepared: | 02/18/2010 0900 | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Mercury | 0.000072 | U | 0.000072 | 0.00020 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Client Sample ID:** **12A**

Lab Sample ID: 660-33863-9
Client Matrix: Water

Date Sampled: 02/15/2010 1350
Date Received: 02/17/2010 0900

## 6010B Metals (ICP)-Total Recoverable

| | | | | |
|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-91239 | Instrument ID: | ICPA |
| Preparation: | 3005A | Prep Batch: 660-90946 | Lab File ID: | 10C01A |
| Dilution: | 1.0 | | Initial Weight/Volume: | 50 mL |
| Date Analyzed: | 03/01/2010 1707 | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/22/2010 1600 | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Copper | 0.0029 | U | 0.0029 | 0.010 |
| Iron | 0.053 | I | 0.050 | 0.20 |
| Potassium | 30 | | 0.19 | 1.0 |
| Magnesium | 62 | | 0.020 | 0.080 |
| Lead | 0.0020 | U | 0.0020 | 0.010 |
| Zinc | 0.033 | | 0.0050 | 0.020 |

| | | | | |
|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-91239 | Instrument ID: | ICPA |
| Preparation: | 3005A | Prep Batch: 660-90946 | Lab File ID: | 10C01A |
| Dilution: | 20 | | Initial Weight/Volume: | 50 mL |
| Date Analyzed: | 03/01/2010 1939 | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/22/2010 1600 | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Sodium | 410 | | 6.2 | 10 |

## 7470A Mercury

| | | | | |
|---|---|---|---|---|
| Method: | 7470A | Analysis Batch: 660-90825 | Instrument ID: | PS200II |
| Preparation: | 7470A | Prep Batch: 660-90800 | Lab File ID: | N/A |
| Dilution: | 1.0 | | Initial Weight/Volume: | 25 mL |
| Date Analyzed: | 02/18/2010 1347 | | Final Weight/Volume: | 25 mL |
| Date Prepared: | 02/18/2010 0900 | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Mercury | 0.000072 | U | 0.000072 | 0.00020 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Client Sample ID:** **9A**

Lab Sample ID: 660-33863-10
Client Matrix: Water

Date Sampled: 02/15/2010 1250
Date Received: 02/17/2010 0900

## 6010B Metals (ICP)-Total Recoverable

| | | | | | |
|---|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-91239 | | Instrument ID: | ICPA |
| Preparation: | 3005A | Prep Batch: 660-90946 | | Lab File ID: | 10C01A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 50 mL |
| Date Analyzed: | 03/01/2010 1713 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/22/2010 1600 | | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Copper | 0.0029 | U | 0.0029 | 0.010 |
| Iron | 0.12 | I | 0.050 | 0.20 |
| Potassium | 17 | | 0.19 | 1.0 |
| Magnesium | 41 | | 0.020 | 0.080 |
| Lead | 0.0020 | U | 0.0020 | 0.010 |
| Zinc | 0.022 | | 0.0050 | 0.020 |

| | | | | | |
|---|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-91239 | | Instrument ID: | ICPA |
| Preparation: | 3005A | Prep Batch: 660-90946 | | Lab File ID: | 10C01A |
| Dilution: | 20 | | | Initial Weight/Volume: | 50 mL |
| Date Analyzed: | 03/01/2010 1945 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/22/2010 1600 | | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Sodium | 210 | | 6.2 | 10 |

## 7470A Mercury

| | | | | | |
|---|---|---|---|---|---|
| Method: | 7470A | Analysis Batch: 660-90825 | | Instrument ID: | PS200II |
| Preparation: | 7470A | Prep Batch: 660-90800 | | Lab File ID: | N/A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 25 mL |
| Date Analyzed: | 02/18/2010 1349 | | | Final Weight/Volume: | 25 mL |
| Date Prepared: | 02/18/2010 0900 | | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Mercury | 0.000072 | U | 0.000072 | 0.00020 |

# Analytical Data

Client: Environmental Engineering Consultant
Job Number: 660-33863-1

**Client Sample ID:** **6B**

Lab Sample ID: 660-33863-11
Client Matrix: Water
Date Sampled: 02/15/2010 1450
Date Received: 02/17/2010 0900

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## 6010B Metals (ICP)-Total Recoverable

Method: 6010B
Preparation: 3005A
Dilution: 1.0
Date Analyzed: 03/02/2010 1759
Date Prepared: 03/02/2010 1030
Analysis Batch: 660-91268
Prep Batch: 660-91263
Instrument ID: ICPA
Lab File ID: 10C02A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Copper | 0.0029 | U | 0.0029 | 0.010 |
| Iron | 0.16 | I | 0.050 | 0.20 |
| Magnesium | 98 | | 0.020 | 0.080 |
| Lead | 0.0020 | U | 0.0020 | 0.010 |
| Zinc | 0.015 | I | 0.0050 | 0.020 |

Method: 6010B
Preparation: 3005A
Dilution: 10
Date Analyzed: 03/02/2010 1847
Date Prepared: 03/02/2010 1030
Analysis Batch: 660-91268
Prep Batch: 660-91263
Instrument ID: ICPA
Lab File ID: 10C02A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Potassium | 33 | | 1.9 | 10 |
| Sodium | 620 | | 3.1 | 5.0 |

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## 7470A Mercury

Method: 7470A
Preparation: 7470A
Dilution: 1.0
Date Analyzed: 02/18/2010 1352
Date Prepared: 02/18/2010 0900
Analysis Batch: 660-90825
Prep Batch: 660-90800
Instrument ID: PS200II
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Mercury | 0.000072 | U | 0.000072 | 0.00020 |

### General Chemistry

**Client Sample ID:** **11A**

Lab Sample ID: 660-33863-1
Client Matrix: Solid

Date Sampled: 02/15/2010 1020
Date Received: 02/17/2010 0900

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Ammonia (as N) | 18 | | mg/Kg | 0.26 | 0.60 | 2.0 | 350.1 |
| | Analysis Batch: 680-161811 | | Date Analyzed: 02/26/2010 1148 | | | | DryWt Corrected: N |
| | Prep Batch: 680-161659 | | Date Prepared: 02/25/2010 1234 | | | | |
| Nitrite as N-Soluble | 1.0 | U | mg/Kg | 1.0 | 5.0 | 1.0 | 353.2 |
| | Analysis Batch: 660-91352 | | Date Analyzed: 03/03/2010 0939 | | | | DryWt Corrected: N |
| Nitrate as N-Soluble | 1.0 | U | mg/Kg | 1.0 | 5.0 | 1.0 | 353.2 |
| | Analysis Batch: 660-91352 | | Date Analyzed: 03/03/2010 0939 | | | | DryWt Corrected: N |
| Phosphorus, Total | 360 | | mg/Kg | 9.9 | 18 | 1.0 | 365.4 |
| | Analysis Batch: 680-161565 | | Date Analyzed: 02/24/2010 1410 | | | | DryWt Corrected: N |
| | Prep Batch: 680-161349 | | Date Prepared: 02/22/2010 1258 | | | | |
| Total Organic Carbon | 38000 | | mg/Kg | 1000 | 3000 | 1.0 | 9060 |
| | Analysis Batch: 680-161519 | | Date Analyzed: 02/23/2010 1035 | | | | DryWt Corrected: N |
| Orthophosphate-Soluble | 1.4 | I | mg/L | 0.75 | 3.0 | 1.0 | SM 4500 P E |
| | Analysis Batch: 660-91342 | | Date Analyzed: 03/02/2010 1600 | | | | DryWt Corrected: N |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Sulfide | 29 | | mg/Kg | 25 | 25 | 1.0 | 9034 |
| | Analysis Batch: 680-161436 | | Date Analyzed: 02/23/2010 1430 | | | | DryWt Corrected: N |
| | Prep Batch: 680-161395 | | Date Prepared: 02/23/2010 1144 | | | | |
| Sulfate-Soluble | 97 | U | mg/Kg | 97 | 97 | 1.0 | 9038 |
| | Analysis Batch: 680-162106 | | Date Analyzed: 03/02/2010 1707 | | | | DryWt Corrected: N |
| pH-Soluble | 7.62 | Q | SU | 1.00 | 1.00 | 1.0 | 9045C |
| | Analysis Batch: 660-90922 | | Date Analyzed: 02/18/2010 2145 | | | | DryWt Corrected: N |
| Percent Solids | 34 | | % | 0.10 | 0.10 | 1.0 | Moisture |
| | Analysis Batch: 660-90780 | | Date Analyzed: 02/17/2010 1456 | | | | DryWt Corrected: N |

## General Chemistry

**Client Sample ID:** **13**

Lab Sample ID: 660-33863-2
Client Matrix: Solid

Date Sampled: 02/15/2010 1110
Date Received: 02/17/2010 0900

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Ammonia (as N) | 46 | | mg/Kg | 1.3 | 3.0 | 10 | 350.1 |
| | Analysis Batch: 680-161811 | Date Analyzed: 02/26/2010 1159 | | | | | DryWt Corrected: N |
| | Prep Batch: 680-161659 | Date Prepared: 02/25/2010 1234 | | | | | |
| Nitrite as N-Soluble | 1.0 | U | mg/Kg | 1.0 | 5.0 | 1.0 | 353.2 |
| | Analysis Batch: 660-91352 | Date Analyzed: 03/03/2010 0939 | | | | | DryWt Corrected: N |
| Nitrate as N-Soluble | 1.0 | U | mg/Kg | 1.0 | 5.0 | 1.0 | 353.2 |
| | Analysis Batch: 660-91352 | Date Analyzed: 03/03/2010 0939 | | | | | DryWt Corrected: N |
| Phosphorus, Total | 360 | | mg/Kg | 11 | 21 | 1.0 | 365.4 |
| | Analysis Batch: 680-161565 | Date Analyzed: 02/24/2010 1410 | | | | | DryWt Corrected: N |
| | Prep Batch: 680-161349 | Date Prepared: 02/22/2010 1258 | | | | | |
| Total Organic Carbon | 57000 | | mg/Kg | 1000 | 3000 | 1.0 | 9060 |
| | Analysis Batch: 680-161519 | Date Analyzed: 02/23/2010 1035 | | | | | DryWt Corrected: N |
| Orthophosphate-Soluble | 1.3 | I | mg/L | 0.75 | 3.0 | 1.0 | SM 4500 P E |
| | Analysis Batch: 660-91342 | Date Analyzed: 03/02/2010 1600 | | | | | DryWt Corrected: N |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Sulfide | 25 | U | mg/Kg | 25 | 25 | 1.0 | 9034 |
| | Analysis Batch: 680-161436 | Date Analyzed: 02/23/2010 1430 | | | | | DryWt Corrected: N |
| | Prep Batch: 680-161395 | Date Prepared: 02/23/2010 1144 | | | | | |
| Sulfate-Soluble | 100 | U | mg/Kg | 100 | 100 | 1.0 | 9038 |
| | Analysis Batch: 680-162106 | Date Analyzed: 03/02/2010 1709 | | | | | DryWt Corrected: N |
| pH-Soluble | 7.41 | Q | SU | 1.00 | 1.00 | 1.0 | 9045C |
| | Analysis Batch: 660-90922 | Date Analyzed: 02/18/2010 2145 | | | | | DryWt Corrected: N |
| Percent Solids | 26 | | % | 0.10 | 0.10 | 1.0 | Moisture |
| | Analysis Batch: 660-90780 | Date Analyzed: 02/17/2010 1429 | | | | | DryWt Corrected: N |

### General Chemistry

**Client Sample ID:** **8A**

Lab Sample ID: 660-33863-3
Client Matrix: Solid

Date Sampled: 02/15/2010 1340
Date Received: 02/17/2010 0900

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Ammonia (as N) | 6.8 | | mg/Kg | 0.13 | 0.30 | 1.0 | 350.1 |
| | Analysis Batch: 680-161811 | Date Analyzed: 02/26/2010 1111 | | | | | DryWt Corrected: N |
| | Prep Batch: 680-161659 | Date Prepared: 02/25/2010 1234 | | | | | |
| Nitrite as N-Soluble | 1.0 | U | mg/Kg | 1.0 | 5.0 | 1.0 | 353.2 |
| | Analysis Batch: 660-91352 | Date Analyzed: 03/03/2010 0939 | | | | | DryWt Corrected: N |
| Nitrate as N-Soluble | 1.0 | U | mg/Kg | 1.0 | 5.0 | 1.0 | 353.2 |
| | Analysis Batch: 660-91352 | Date Analyzed: 03/03/2010 0939 | | | | | DryWt Corrected: N |
| Phosphorus, Total | 160 | | mg/Kg | 10 | 18 | 1.0 | 365.4 |
| | Analysis Batch: 680-161565 | Date Analyzed: 02/24/2010 1410 | | | | | DryWt Corrected: N |
| | Prep Batch: 680-161349 | Date Prepared: 02/22/2010 1258 | | | | | |
| Total Organic Carbon | 18000 | | mg/Kg | 1000 | 3000 | 1.0 | 9060 |
| | Analysis Batch: 680-161519 | Date Analyzed: 02/23/2010 1035 | | | | | DryWt Corrected: N |
| Orthophosphate-Soluble | 0.75 | U | mg/L | 0.75 | 3.0 | 1.0 | SM 4500 P E |
| | Analysis Batch: 660-91342 | Date Analyzed: 03/02/2010 1600 | | | | | DryWt Corrected: N |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Sulfide | 25 | U | mg/Kg | 25 | 25 | 1.0 | 9034 |
| | Analysis Batch: 680-161436 | Date Analyzed: 02/23/2010 1430 | | | | | DryWt Corrected: N |
| | Prep Batch: 680-161395 | Date Prepared: 02/23/2010 1144 | | | | | |
| Sulfate-Soluble | 100 | U | mg/Kg | 100 | 100 | 1.0 | 9038 |
| | Analysis Batch: 680-162106 | Date Analyzed: 03/02/2010 1709 | | | | | DryWt Corrected: N |
| pH-Soluble | 7.56 | Q | SU | 1.00 | 1.00 | 1.0 | 9045C |
| | Analysis Batch: 660-90922 | Date Analyzed: 02/18/2010 2145 | | | | | DryWt Corrected: N |
| Percent Solids | 32 | | % | 0.10 | 0.10 | 1.0 | Moisture |
| | Analysis Batch: 660-90780 | Date Analyzed: 02/17/2010 1428 | | | | | DryWt Corrected: N |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

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### General Chemistry

**Client Sample ID:** **6B**

Lab Sample ID: 660-33863-4

Client Matrix: Solid

Date Sampled: 02/15/2010 1400

Date Received: 02/17/2010 0900

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Ammonia (as N) | 14 | | mg/Kg | 0.26 | 0.60 | 2.0 | 350.1 |
| | Analysis Batch: 680-161811 | | Date Analyzed: 02/26/2010 1148 | | | | DryWt Corrected: N |
| | Prep Batch: 680-161659 | | Date Prepared: 02/25/2010 1234 | | | | |
| Nitrite as N-Soluble | 1.0 | U | mg/Kg | 1.0 | 5.0 | 1.0 | 353.2 |
| | Analysis Batch: 660-91352 | | Date Analyzed: 03/03/2010 0939 | | | | DryWt Corrected: N |
| Nitrate as N-Soluble | 1.0 | U | mg/Kg | 1.0 | 5.0 | 1.0 | 353.2 |
| | Analysis Batch: 660-91352 | | Date Analyzed: 03/03/2010 0939 | | | | DryWt Corrected: N |
| Phosphorus, Total | 670 | | mg/Kg | 9.7 | 18 | 1.0 | 365.4 |
| | Analysis Batch: 680-161565 | | Date Analyzed: 02/24/2010 1410 | | | | DryWt Corrected: N |
| | Prep Batch: 680-161349 | | Date Prepared: 02/22/2010 1258 | | | | |
| Total Organic Carbon | 39000 | | mg/Kg | 1000 | 3000 | 1.0 | 9060 |
| | Analysis Batch: 680-161519 | | Date Analyzed: 02/23/2010 1035 | | | | DryWt Corrected: N |
| Orthophosphate-Soluble | 1.9 | I | mg/L | 0.75 | 3.0 | 1.0 | SM 4500 P E |
| | Analysis Batch: 660-91342 | | Date Analyzed: 03/02/2010 1600 | | | | DryWt Corrected: N |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Sulfide | 25 | U | mg/Kg | 25 | 25 | 1.0 | 9034 |
| | Analysis Batch: 680-161436 | | Date Analyzed: 02/23/2010 1430 | | | | DryWt Corrected: N |
| | Prep Batch: 680-161395 | | Date Prepared: 02/23/2010 1144 | | | | |
| Sulfate-Soluble | 98 | U | mg/Kg | 98 | 98 | 1.0 | 9038 |
| | Analysis Batch: 680-162106 | | Date Analyzed: 03/02/2010 1718 | | | | DryWt Corrected: N |
| pH-Soluble | 7.56 | Q | SU | 1.00 | 1.00 | 1.0 | 9045C |
| | Analysis Batch: 660-90922 | | Date Analyzed: 02/18/2010 2145 | | | | DryWt Corrected: N |
| Percent Solids | 22 | | % | 0.10 | 0.10 | 1.0 | Moisture |
| | Analysis Batch: 660-90780 | | Date Analyzed: 02/17/2010 1503 | | | | DryWt Corrected: N |

## General Chemistry

**Client Sample ID:** **11A**

Lab Sample ID: 660-33863-5

Client Matrix: Water

Date Sampled: 02/15/2010 1010

Date Received: 02/17/2010 0900

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Nitrite as N | 0.10 | U Q | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| | Analysis Batch: 660-90798 | Date Analyzed: 02/17/2010 1242 | | | | | |
| Nitrate as N | 1.7 | Q | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| | Analysis Batch: 660-90798 | Date Analyzed: 02/17/2010 1242 | | | | | |
| Phosphorus, Total | 0.10 | U | mg/L | 0.10 | 0.30 | 1.0 | 365.4 |
| | Analysis Batch: 660-91269 | Date Analyzed: 03/02/2010 0939 | | | | | |
| | Prep Batch: 660-91206 | Date Prepared: 03/01/2010 1300 | | | | | |
| Sulfate | 150 | | mg/L | 10 | 25 | 5.0 | SM 426C |
| | Analysis Batch: 660-91248 | Date Analyzed: 03/01/2010 1350 | | | | | |
| Chloride | 950 | | mg/L | 30 | 50 | 10 | SM 4500 Cl- E |
| | Analysis Batch: 660-91159 | Date Analyzed: 02/25/2010 1400 | | | | | |
| Chemical Oxygen Demand | 33 | | mg/L | 10 | 20 | 1.0 | SM 5220D |
| | Analysis Batch: 660-91132 | Date Analyzed: 02/25/2010 1557 | | | | | |
| | Prep Batch: 660-91131 | Date Prepared: 02/25/2010 1333 | | | | | |
| Tannins and Lignins | 1.0 | | mg/L | 0.037 | 0.10 | 1.0 | SM 5550B |
| | Analysis Batch: 680-161223 | Date Analyzed: 02/19/2010 1126 | | | | | |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Turbidity | 45 | Q | NTU | 0.20 | 0.20 | 2.0 | 180.1 |
| | Analysis Batch: 660-90880 | Date Analyzed: 02/18/2010 2100 | | | | | |
| Biochemical Oxygen Demand | 2.0 | Q,U | mg/L | 2.00 | 2.00 | 1.0 | 405.1 |
| | Analysis Batch: 660-91308 | Date Analyzed: 02/23/2010 0830 | | | | | |
| Chlorophyll a | 21.7 | Q | ug/L | 2.00 | 2.00 | 1.0 | SM 10200H |
| | Analysis Batch: 660-91277 | Date Analyzed: 02/23/2010 1221 | | | | | |
| Alkalinity | 270 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2320B |
| | Analysis Batch: 660-90996 | Date Analyzed: 02/23/2010 1024 | | | | | |
| Salinity | 2.5 | | ppt | 2.0 | 2.0 | 1.0 | SM 2520B |
| | Analysis Batch: 660-91137 | Date Analyzed: 02/25/2010 1400 | | | | | |
| Total Suspended Solids | 110 | | mg/L | 2.0 | 2.0 | 1.0 | SM 2540D |
| | Analysis Batch: 660-90872 | Date Analyzed: 02/19/2010 1457 | | | | | |
| Sulfide | 1.0 | U | mg/L | 1.0 | 1.0 | 1.0 | SM 4500 S2 F |
| | Analysis Batch: 660-90918 | Date Analyzed: 02/19/2010 1600 | | | | | |

## General Chemistry

**Client Sample ID:** **8A**

Lab Sample ID: 660-33863-6
Client Matrix: Water

Date Sampled: 02/15/2010 1330
Date Received: 02/17/2010 0900

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Nitrite as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| Analysis Batch: 660-90798 | | Date Analyzed: 02/17/2010 1242 | | | | | |
| Nitrate as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| Analysis Batch: 660-90798 | | Date Analyzed: 02/17/2010 1242 | | | | | |
| Phosphorus, Total | 0.10 | U | mg/L | 0.10 | 0.30 | 1.0 | 365.4 |
| Analysis Batch: 660-91269 | | Date Analyzed: 03/02/2010 0939 | | | | | |
| Prep Batch: 660-91206 | | Date Prepared: 03/01/2010 1300 | | | | | |
| Sulfate | 82 | | mg/L | 10 | 25 | 5.0 | SM 426C |
| Analysis Batch: 660-91248 | | Date Analyzed: 03/01/2010 1350 | | | | | |
| Chloride | 440 | | mg/L | 30 | 50 | 10 | SM 4500 Cl- E |
| Analysis Batch: 660-91159 | | Date Analyzed: 02/25/2010 1400 | | | | | |
| Chemical Oxygen Demand | 21 | | mg/L | 10 | 20 | 1.0 | SM 5220D |
| Analysis Batch: 660-91132 | | Date Analyzed: 02/25/2010 1557 | | | | | |
| Prep Batch: 660-91131 | | Date Prepared: 02/25/2010 1333 | | | | | |
| Tannins and Lignins | 1.2 | | mg/L | 0.037 | 0.10 | 1.0 | SM 5550B |
| Analysis Batch: 680-161223 | | Date Analyzed: 02/19/2010 1126 | | | | | |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Turbidity | 6.5 | Q | NTU | 0.10 | 0.10 | 1.0 | 180.1 |
| Analysis Batch: 660-90880 | | Date Analyzed: 02/18/2010 2100 | | | | | |
| Biochemical Oxygen Demand | 2.00 | Q,U | mg/L | 2.00 | 2.00 | 1.0 | 405.1 |
| Analysis Batch: 660-91308 | | Date Analyzed: 02/23/2010 0830 | | | | | |
| Chlorophyll a | 18.3 | Q | ug/L | 2.00 | 2.00 | 1.0 | SM 10200H |
| Analysis Batch: 660-91277 | | Date Analyzed: 02/23/2010 1223 | | | | | |
| Alkalinity | 280 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2320B |
| Analysis Batch: 660-90996 | | Date Analyzed: 02/23/2010 1038 | | | | | |
| Salinity | 2.0 | U | ppt | 2.0 | 2.0 | 1.0 | SM 2520B |
| Analysis Batch: 660-91137 | | Date Analyzed: 02/25/2010 1400 | | | | | |
| Total Suspended Solids | 10 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2540D |
| Analysis Batch: 660-90872 | | Date Analyzed: 02/19/2010 1457 | | | | | |
| Sulfide | 1.0 | U | mg/L | 1.0 | 1.0 | 1.0 | SM 4500 S2 F |
| Analysis Batch: 660-90918 | | Date Analyzed: 02/19/2010 1600 | | | | | |

## General Chemistry

**Client Sample ID:** **13**

Lab Sample ID: 660-33863-7　　Date Sampled: 02/15/2010 1100
Client Matrix: Water　　Date Received: 02/17/2010 0900

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Nitrite as N | 0.16 | I Q | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| | Analysis Batch: 660-90798 | Date Analyzed: 02/17/2010 1242 | | | | | |
| Nitrate as N | 5.8 | Q | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| | Analysis Batch: 660-90798 | Date Analyzed: 02/17/2010 1242 | | | | | |
| Phosphorus, Total | 0.10 | U J3 | mg/L | 0.10 | 0.30 | 1.0 | 365.4 |
| | Analysis Batch: 660-91269 | Date Analyzed: 03/02/2010 0939 | | | | | |
| | Prep Batch: 660-91206 | Date Prepared: 03/01/2010 1300 | | | | | |
| Sulfate | 71 | | mg/L | 4.0 | 10 | 2.0 | SM 426C |
| | Analysis Batch: 660-91248 | Date Analyzed: 03/01/2010 1350 | | | | | |
| Chloride | 160 | | mg/L | 12 | 20 | 4.0 | SM 4500 Cl- E |
| | Analysis Batch: 660-91210 | Date Analyzed: 02/27/2010 0946 | | | | | |
| Chemical Oxygen Demand | 10 | U J3 | mg/L | 10 | 20 | 1.0 | SM 5220D |
| | Analysis Batch: 660-91132 | Date Analyzed: 02/25/2010 1557 | | | | | |
| | Prep Batch: 660-91131 | Date Prepared: 02/25/2010 1333 | | | | | |
| Tannins and Lignins | 0.47 | | mg/L | 0.037 | 0.10 | 1.0 | SM 5550B |
| | Analysis Batch: 680-161223 | Date Analyzed: 02/19/2010 1126 | | | | | |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Turbidity | 17 | Q | NTU | 0.10 | 0.10 | 1.0 | 180.1 |
| | Analysis Batch: 660-90880 | Date Analyzed: 02/18/2010 2100 | | | | | |
| Biochemical Oxygen Demand | 2.16 | Q | mg/L | 2.00 | 2.00 | 1.0 | 405.1 |
| | Analysis Batch: 660-91308 | Date Analyzed: 02/23/2010 0830 | | | | | |
| Chlorophyll a | 14.9 | Q | ug/L | 2.00 | 2.00 | 1.0 | SM 10200H |
| | Analysis Batch: 660-91277 | Date Analyzed: 02/23/2010 1224 | | | | | |
| Alkalinity | 280 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2320B |
| | Analysis Batch: 660-90996 | Date Analyzed: 02/23/2010 1044 | | | | | |
| Salinity | 2.0 | U | ppt | 2.0 | 2.0 | 1.0 | SM 2520B |
| | Analysis Batch: 660-91137 | Date Analyzed: 02/25/2010 1400 | | | | | |
| Total Suspended Solids | 31 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2540D |
| | Analysis Batch: 660-90872 | Date Analyzed: 02/19/2010 1457 | | | | | |
| Sulfide | 1.0 | U | mg/L | 1.0 | 1.0 | 1.0 | SM 4500 S2 F |
| | Analysis Batch: 660-90918 | Date Analyzed: 02/19/2010 1600 | | | | | |

## General Chemistry

**Client Sample ID:** **14**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33863-8 | Date Sampled: | 02/15/2010 1140 |
| Client Matrix: | Water | Date Received: | 02/17/2010 0900 |

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Nitrite as N | 0.10 | U Q | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| | Analysis Batch: 660-90798 | Date Analyzed: 02/17/2010 1242 | | | | | |
| Nitrate as N | 0.33 | I Q | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| | Analysis Batch: 660-90798 | Date Analyzed: 02/17/2010 1242 | | | | | |
| Phosphorus, Total | 0.10 | U | mg/L | 0.10 | 0.30 | 1.0 | 365.4 |
| | Analysis Batch: 660-91269 | Date Analyzed: 03/02/2010 0939 | | | | | |
| | Prep Batch: 660-91206 | Date Prepared: 03/01/2010 1300 | | | | | |
| Sulfate | 90 | | mg/L | 10 | 25 | 5.0 | SM 426C |
| | Analysis Batch: 660-91248 | Date Analyzed: 03/01/2010 1350 | | | | | |
| Chloride | 290 | | mg/L | 30 | 50 | 10 | SM 4500 Cl- E |
| | Analysis Batch: 660-91159 | Date Analyzed: 02/25/2010 1400 | | | | | |
| Chemical Oxygen Demand | 30 | | mg/L | 10 | 20 | 1.0 | SM 5220D |
| | Analysis Batch: 660-91132 | Date Analyzed: 02/25/2010 1557 | | | | | |
| | Prep Batch: 660-91131 | Date Prepared: 02/25/2010 1333 | | | | | |
| Tannins and Lignins | 1.0 | | mg/L | 0.037 | 0.10 | 1.0 | SM 5550B |
| | Analysis Batch: 680-161223 | Date Analyzed: 02/19/2010 1126 | | | | | |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Turbidity | 79 | Q | NTU | 0.20 | 0.20 | 2.0 | 180.1 |
| | Analysis Batch: 660-90880 | Date Analyzed: 02/18/2010 2100 | | | | | |
| Biochemical Oxygen Demand | 2.73 | Q | mg/L | 2.00 | 2.00 | 1.0 | 405.1 |
| | Analysis Batch: 660-91308 | Date Analyzed: 02/23/2010 0830 | | | | | |
| Chlorophyll a | 64.2 | Q | ug/L | 2.00 | 2.00 | 1.0 | SM 10200H |
| | Analysis Batch: 660-91277 | Date Analyzed: 02/23/2010 1225 | | | | | |
| Alkalinity | 310 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2320B |
| | Analysis Batch: 660-90996 | Date Analyzed: 02/23/2010 1051 | | | | | |
| Salinity | 2.0 | U | ppt | 2.0 | 2.0 | 1.0 | SM 2520B |
| | Analysis Batch: 660-91137 | Date Analyzed: 02/25/2010 1400 | | | | | |
| Total Suspended Solids | 150 | | mg/L | 1.9 | 1.9 | 1.0 | SM 2540D |
| | Analysis Batch: 660-90872 | Date Analyzed: 02/19/2010 1457 | | | | | |
| Sulfide | 1.0 | U | mg/L | 1.0 | 1.0 | 1.0 | SM 4500 S2 F |
| | Analysis Batch: 660-90918 | Date Analyzed: 02/19/2010 1600 | | | | | |

# Analytical Data

Client: Environmental Engineering Consultant Job Number: 660-33863-1

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## General Chemistry

**Client Sample ID:** **12A**

Lab Sample ID: 660-33863-9
Client Matrix: Water

Date Sampled: 02/15/2010 1350
Date Received: 02/17/2010 0900

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Nitrite as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| Analysis Batch: 660-90798 | Date Analyzed: 02/17/2010 1242 | | | | | | |
| Nitrate as N | 0.41 | I | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| Analysis Batch: 660-90798 | Date Analyzed: 02/17/2010 1242 | | | | | | |
| Phosphorus, Total | 0.10 | U | mg/L | 0.10 | 0.30 | 1.0 | 365.4 |
| Analysis Batch: 660-91269 | Date Analyzed: 03/02/2010 0939 | | | | | | |
| Prep Batch: 660-91206 | Date Prepared: 03/01/2010 1300 | | | | | | |
| Sulfate | 120 | | mg/L | 10 | 25 | 5.0 | SM 426C |
| Analysis Batch: 660-91248 | Date Analyzed: 03/01/2010 1350 | | | | | | |
| Chloride | 670 | | mg/L | 30 | 50 | 10 | SM 4500 Cl- E |
| Analysis Batch: 660-91159 | Date Analyzed: 02/25/2010 1400 | | | | | | |
| Chemical Oxygen Demand | 33 | | mg/L | 10 | 20 | 1.0 | SM 5220D |
| Analysis Batch: 660-91132 | Date Analyzed: 02/25/2010 1557 | | | | | | |
| Prep Batch: 660-91131 | Date Prepared: 02/25/2010 1333 | | | | | | |
| Tannins and Lignins | 1.1 | | mg/L | 0.037 | 0.10 | 1.0 | SM 5550B |
| Analysis Batch: 680-161223 | Date Analyzed: 02/19/2010 1126 | | | | | | |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Turbidity | 3.5 | | NTU | 0.10 | 0.10 | 1.0 | 180.1 |
| Analysis Batch: 660-90880 | Date Analyzed: 02/18/2010 2100 | | | | | | |
| Biochemical Oxygen Demand | 2.00 | Q,U | mg/L | 2.00 | 2.00 | 1.0 | 405.1 |
| Analysis Batch: 660-91308 | Date Analyzed: 02/23/2010 0830 | | | | | | |
| Chlorophyll a | 10.3 | Q | ug/L | 2.00 | 2.00 | 1.0 | SM 10200H |
| Analysis Batch: 660-91277 | Date Analyzed: 02/23/2010 1227 | | | | | | |
| Alkalinity | 280 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2320B |
| Analysis Batch: 660-90996 | Date Analyzed: 02/23/2010 1058 | | | | | | |
| Salinity | 2.0 | | ppt | 2.0 | 2.0 | 1.0 | SM 2520B |
| Analysis Batch: 660-91137 | Date Analyzed: 02/25/2010 1400 | | | | | | |
| Total Suspended Solids | 4.4 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2540D |
| Analysis Batch: 660-90872 | Date Analyzed: 02/19/2010 1457 | | | | | | |
| Sulfide | 1.0 | U | mg/L | 1.0 | 1.0 | 1.0 | SM 4500 S2 F |
| Analysis Batch: 660-90918 | Date Analyzed: 02/19/2010 1600 | | | | | | |

## General Chemistry

**Client Sample ID:** **9A**

Lab Sample ID: 660-33863-10
Client Matrix: Water

Date Sampled: 02/15/2010 1250
Date Received: 02/17/2010 0900

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Nitrite as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| | Analysis Batch: 660-90798 | Date Analyzed: 02/17/2010 1242 | | | | | |
| Nitrate as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| | Analysis Batch: 660-90798 | Date Analyzed: 02/17/2010 1242 | | | | | |
| Phosphorus, Total | 0.10 | U | mg/L | 0.10 | 0.30 | 1.0 | 365.4 |
| | Analysis Batch: 660-91269 | Date Analyzed: 03/02/2010 0939 | | | | | |
| | Prep Batch: 660-91206 | Date Prepared: 03/01/2010 1300 | | | | | |
| Sulfate | 69 | | mg/L | 4.0 | 10 | 2.0 | SM 426C |
| | Analysis Batch: 660-91248 | Date Analyzed: 03/01/2010 1350 | | | | | |
| Chloride | 340 | | mg/L | 30 | 50 | 10 | SM 4500 Cl- E |
| | Analysis Batch: 660-91159 | Date Analyzed: 02/25/2010 1400 | | | | | |
| Chemical Oxygen Demand | 20 | | mg/L | 10 | 20 | 1.0 | SM 5220D |
| | Analysis Batch: 660-91132 | Date Analyzed: 02/25/2010 1557 | | | | | |
| | Prep Batch: 660-91131 | Date Prepared: 02/25/2010 1333 | | | | | |
| Tannins and Lignins | 1.2 | | mg/L | 0.037 | 0.10 | 1.0 | SM 5550B |
| | Analysis Batch: 680-161223 | Date Analyzed: 02/19/2010 1126 | | | | | |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Turbidity | 5.7 | Q | NTU | 0.10 | 0.10 | 1.0 | 180.1 |
| | Analysis Batch: 660-90880 | Date Analyzed: 02/18/2010 2100 | | | | | |
| Biochemical Oxygen Demand | 2.00 | Q,U | mg/L | 2.00 | 2.00 | 1.0 | 405.1 |
| | Analysis Batch: 660-91308 | Date Analyzed: 02/23/2010 0830 | | | | | |
| Chlorophyll a | 29.6 | Q | ug/L | 2.00 | 2.00 | 1.0 | SM 10200H |
| | Analysis Batch: 660-91277 | Date Analyzed: 02/23/2010 1228 | | | | | |
| Alkalinity | 290 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2320B |
| | Analysis Batch: 660-90996 | Date Analyzed: 02/23/2010 1104 | | | | | |
| Salinity | 2.0 | U | ppt | 2.0 | 2.0 | 1.0 | SM 2520B |
| | Analysis Batch: 660-91137 | Date Analyzed: 02/25/2010 1400 | | | | | |
| Total Suspended Solids | 16 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2540D |
| | Analysis Batch: 660-90872 | Date Analyzed: 02/19/2010 1458 | | | | | |
| Sulfide | 1.0 | U | mg/L | 1.0 | 1.0 | 1.0 | SM 4500 S2 F |
| | Analysis Batch: 660-90918 | Date Analyzed: 02/19/2010 1600 | | | | | |

### General Chemistry

**Client Sample ID:** **6B**

Lab Sample ID: 660-33863-11
Client Matrix: Water

Date Sampled: 02/15/2010 1450
Date Received: 02/17/2010 0900

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Nitrite as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| | Analysis Batch: 660-90798 | Date Analyzed: 02/17/2010 1242 | | | | | |
| Nitrate as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| | Analysis Batch: 660-90798 | Date Analyzed: 02/17/2010 1242 | | | | | |
| Phosphorus, Total | 0.10 | U | mg/L | 0.10 | 0.30 | 1.0 | 365.4 |
| | Analysis Batch: 660-91269 | Date Analyzed: 03/02/2010 0939 | | | | | |
| | Prep Batch: 660-91206 | Date Prepared: 03/01/2010 1300 | | | | | |
| Sulfate | 140 | | mg/L | 10 | 25 | 5.0 | SM 426C |
| | Analysis Batch: 660-91248 | Date Analyzed: 03/01/2010 1350 | | | | | |
| Chloride | 960 | | mg/L | 30 | 50 | 10 | SM 4500 Cl- E |
| | Analysis Batch: 660-91159 | Date Analyzed: 02/25/2010 1400 | | | | | |
| Chemical Oxygen Demand | 63 | | mg/L | 10 | 20 | 1.0 | SM 5220D |
| | Analysis Batch: 660-91132 | Date Analyzed: 02/25/2010 1557 | | | | | |
| | Prep Batch: 660-91131 | Date Prepared: 02/25/2010 1333 | | | | | |
| Tannins and Lignins | 2.3 | | mg/L | 0.074 | 0.20 | 2.0 | SM 5550B |
| | Analysis Batch: 680-161223 | Date Analyzed: 02/19/2010 1131 | | | | | |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Turbidity | 15 | Q | NTU | 0.10 | 0.10 | 1.0 | 180.1 |
| | Analysis Batch: 660-90880 | Date Analyzed: 02/18/2010 2100 | | | | | |
| Biochemical Oxygen Demand | 8.72 | Q | mg/L | 2.00 | 2.00 | 1.0 | 405.1 |
| | Analysis Batch: 660-91308 | Date Analyzed: 02/23/2010 0830 | | | | | |
| Chlorophyll a | 30.9 | Q | ug/L | 2.00 | 2.00 | 1.0 | SM 10200H |
| | Analysis Batch: 660-91277 | Date Analyzed: 02/23/2010 1230 | | | | | |
| Alkalinity | 470 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2320B |
| | Analysis Batch: 660-90996 | Date Analyzed: 02/23/2010 1112 | | | | | |
| Salinity | 3.0 | | ppt | 2.0 | 2.0 | 1.0 | SM 2520B |
| | Analysis Batch: 660-91137 | Date Analyzed: 02/25/2010 1400 | | | | | |
| Total Suspended Solids | 22 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2540D |
| | Analysis Batch: 660-90872 | Date Analyzed: 02/19/2010 1458 | | | | | |
| Sulfide | 1.0 | U | mg/L | 1.0 | 1.0 | 1.0 | SM 4500 S2 F |
| | Analysis Batch: 660-90918 | Date Analyzed: 02/19/2010 1600 | | | | | |

# DATA REPORTING QUALIFIERS

Client: Environmental Engineering Consultant Job Number: 660-33863-1

| Lab Section | Qualifier | Description |
|---|---|---|
| GC VOA | | |
| | V | Indicates the analyte was detected in both the sample and the associated method blank. |
| | I | The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit. |
| GC Semi VOA | | |
| | J3 | Estimated value; value may not be accurate. Spike recovery or RPD outside of criteria. |
| | J1 | Estimated value; value may not be accurate. Surrogate recovery outside of criteria. |
| | U | Indicates that the compound was analyzed for but not detected. |
| | L | Off-scale high. Actual value is known to be greater than the value given. |
| | I | The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit. |
| Metals | | |
| | J3 | Estimated value; value may not be accurate. Spike recovery or RPD outside of criteria. |
| | U | Indicates that the compound was analyzed for but not detected. |
| | I | The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit. |
| General Chemistry | | |
| | J3 | Estimated value; value may not be accurate. Spike recovery or RPD outside of criteria. |
| | U | Indicates that the compound was analyzed for but not detected. |
| | Q | Sample held beyond the accepted holding time. |
| | I | The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit. |

## Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Method Blank - Batch: 400-104462**

**Method: RSK-175**
**Preparation: N/A**

Lab Sample ID: MB 400-104462/1
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/26/2010 0808
Date Prepared: N/A

Analysis Batch: 400-104462
Prep Batch: N/A
Units: ug/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL
Injection Volume:

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Carbon dioxide (as CO2) | 8.00 | I | 7.0 | 50 |

**Lab Control Sample/**
**Lab Control Sample Duplicate Recovery Report - Batch: 400-104462**

**Method: RSK-175**
**Preparation: N/A**

LCS Lab Sample ID: LCS 400-104462/2
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/26/2010 0743
Date Prepared: N/A

Analysis Batch: 400-104462
Prep Batch: N/A
Units: ug/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL
Injection Volume:

LCSD Lab Sample ID: LCSD 400-104462/3
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/26/2010 0755
Date Prepared: N/A

Analysis Batch: 400-104462
Prep Batch: N/A
Units: ug/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL
Injection Volume:

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | LCS | LCSD | Limit | RPD | RPD Limit | LCS Qual | LCSD Qual |
| Carbon dioxide (as CO2) | 104 | 108 | 80 - 120 | 4 | 50 | | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Method Blank - Batch: 660-90781**

**Method: 8081A**
**Preparation: 3510C**

| | | | | | |
|---|---|---|---|---|---|
| Lab Sample ID: | MB 660-90781/1-A | Analysis Batch: | 660-91002 | Instrument ID: | BSGJ |
| Client Matrix: | Water | Prep Batch: | 660-90781 | Lab File ID: | 1B19J044.D |
| Dilution: | 1.0 | Units: | ug/L | Initial Weight/Volume: | 1000 mL |
| Date Analyzed: | 02/19/2010 2106 | | | Final Weight/Volume: | 10 mL |
| Date Prepared: | 02/18/2010 0642 | | | Injection Volume: | 2 uL |
| | | | | Column ID: | PRIMARY |

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| 4,4'-DDD | 0.0041 | U | 0.0041 | 0.010 |
| 4,4'-DDE | 0.0055 | U | 0.0055 | 0.010 |
| 4,4'-DDT | 0.0032 | U | 0.0032 | 0.010 |
| Aldrin | 0.0018 | U | 0.0018 | 0.010 |
| alpha-BHC | 0.0028 | U | 0.0028 | 0.010 |
| beta-BHC | 0.0027 | U | 0.0027 | 0.010 |
| Chlordane (technical) | 0.057 | U | 0.057 | 0.50 |
| delta-BHC | 0.0028 | U | 0.0028 | 0.010 |
| Dieldrin | 0.0014 | U | 0.0014 | 0.010 |
| Endosulfan I | 0.0034 | U | 0.0034 | 0.010 |
| Endosulfan II | 0.0033 | U | 0.0033 | 0.010 |
| Endosulfan sulfate | 0.0030 | U | 0.0030 | 0.010 |
| Endrin | 0.0031 | U | 0.0031 | 0.010 |
| Endrin aldehyde | 0.0032 | U | 0.0032 | 0.010 |
| Endrin ketone | 0.0054 | U | 0.0054 | 0.10 |
| gamma-BHC (Lindane) | 0.0026 | U | 0.0026 | 0.010 |
| Heptachlor | 0.0031 | U | 0.0031 | 0.010 |
| Heptachlor epoxide | 0.0031 | U | 0.0031 | 0.010 |
| Methoxychlor | 0.0051 | U | 0.0051 | 0.010 |
| Toxaphene | 0.72 | U | 0.72 | 3.0 |

| Surrogate | % Rec | Acceptance Limits |
|---|---|---|
| DCB Decachlorobiphenyl | 71 | 30 - 150 |
| Tetrachloro-m-xylene | 75 | 30 - 150 |

**Lab Control Sample/**
**Lab Control Sample Duplicate Recovery Report - Batch: 660-90781**

**Method: 8081A**
**Preparation: 3510C**

LCS Lab Sample ID: LCS 660-90781/2-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/23/2010 1157
Date Prepared: 02/18/2010 0642

Analysis Batch: 660-91002
Prep Batch: 660-90781
Units: ug/L

Instrument ID: BSGJ
Lab File ID: 1B23J014.D
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Column ID: PRIMARY

LCSD Lab Sample ID: LCSD 660-90781/3-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/23/2010 1211
Date Prepared: 02/18/2010 0642

Analysis Batch: 660-91002
Prep Batch: 660-90781
Units: ug/L

Instrument ID: BSGJ
Lab File ID: 1B23J015.D
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Column ID: PRIMARY

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | LCS | LCSD | Limit | RPD | RPD Limit | LCS Qual | LCSD Qual |
| 4,4'-DDD | 99 | 106 | 37 - 139 | 6 | 39 | | |
| 4,4'-DDE | 99 | 104 | 39 - 130 | 4 | 18 | | |
| 4,4'-DDT | 98 | 104 | 46 - 130 | 6 | 27 | | |
| Aldrin | 81 | 89 | 31 - 130 | 9 | 25 | | |
| alpha-BHC | 101 | 104 | 48 - 130 | 3 | 30 | | |
| beta-BHC | 101 | 103 | 41 - 130 | 3 | 35 | | |
| delta-BHC | 96 | 99 | 42 - 130 | 3 | 41 | | |
| Dieldrin | 97 | 101 | 51 - 130 | 4 | 42 | | |
| Endosulfan I | 96 | 99 | 40 - 130 | 4 | 24 | | |
| Endosulfan II | 95 | 97 | 41 - 130 | 3 | 22 | | |
| Endosulfan sulfate | 92 | 96 | 33 - 142 | 4 | 28 | | |
| Endrin | 94 | 97 | 49 - 130 | 3 | 25 | | |
| Endrin aldehyde | 90 | 93 | 34 - 132 | 3 | 34 | | |
| Endrin ketone | 99 | 102 | 26 - 144 | 2 | 25 | | |
| gamma-BHC (Lindane) | 98 | 101 | 53 - 130 | 3 | 26 | | |
| Heptachlor | 87 | 94 | 36 - 130 | 7 | 26 | | |
| Heptachlor epoxide | 96 | 98 | 41 - 130 | 1 | 31 | | |
| Methoxychlor | 96 | 100 | 45 - 130 | 5 | 43 | | |

| Surrogate | LCS % Rec | LCSD % Rec | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 86 | 84 | 30 - 150 |
| Tetrachloro-m-xylene | 87 | 91 | 30 - 150 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Method Blank - Batch: 660-90841**

**Method: 8081A**
**Preparation: 3550B**

| | | | | | |
|---|---|---|---|---|---|
| Lab Sample ID: | MB 660-90841/1-A | Analysis Batch: | 660-90917 | Instrument ID: | BSGJ |
| Client Matrix: | Solid | Prep Batch: | 660-90841 | Lab File ID: | 1B19J019.D |
| Dilution: | 1.0 | Units: | ug/Kg | Initial Weight/Volume: | 30.00 g |
| Date Analyzed: | 02/19/2010 1534 | | | Final Weight/Volume: | 10 mL |
| Date Prepared: | 02/19/2010 0657 | | | Injection Volume: | 2 uL |
| | | | | Column ID: | PRIMARY |

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| 4,4'-DDD | 0.50 | U | 0.50 | 3.3 |
| 4,4'-DDE | 0.50 | U | 0.50 | 3.3 |
| 4,4'-DDT | 0.50 | U | 0.50 | 3.3 |
| Aldrin | 0.50 | U | 0.50 | 2.0 |
| alpha-BHC | 0.14 | U | 0.14 | 1.7 |
| beta-BHC | 0.50 | U | 0.50 | 2.0 |
| Chlordane (technical) | 2.4 | U | 2.4 | 17 |
| delta-BHC | 0.50 | U | 0.50 | 2.0 |
| Dieldrin | 0.15 | U | 0.15 | 1.7 |
| Endosulfan I | 0.25 | U | 0.25 | 2.0 |
| Endosulfan II | 0.25 | U | 0.25 | 3.3 |
| Endosulfan sulfate | 0.25 | U | 0.25 | 3.3 |
| Endrin | 0.50 | U | 0.50 | 4.0 |
| Endrin aldehyde | 0.50 | U | 0.50 | 4.0 |
| Endrin ketone | 0.50 | U | 0.50 | 4.0 |
| gamma-BHC (Lindane) | 0.50 | U | 0.50 | 2.0 |
| Heptachlor | 0.50 | U | 0.50 | 2.0 |
| Heptachlor epoxide | 0.14 | U | 0.14 | 2.0 |
| Methoxychlor | 1.0 | U | 1.0 | 17 |
| Toxaphene | 29 | U | 29 | 170 |

| Surrogate | % Rec | Acceptance Limits |
|---|---|---|
| DCB Decachlorobiphenyl | 78 | 30 - 150 |
| Tetrachloro-m-xylene | 87 | 30 - 150 |

## Lab Control Sample - Batch: 660-90841

**Method: 8081A**
**Preparation: 3550B**

Lab Sample ID: LCS 660-90841/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/19/2010 1547
Date Prepared: 02/19/2010 0657

Analysis Batch: 660-90917
Prep Batch: 660-90841
Units: ug/Kg

Instrument ID: BSGJ
Lab File ID: 1B19J020.D
Initial Weight/Volume: 30.00 g
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Column ID: PRIMARY

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| 4,4'-DDD | 16.7 | 16.3 | 98 | 62 - 130 | |
| 4,4'-DDE | 16.7 | 17.2 | 103 | 60 - 130 | |
| 4,4'-DDT | 16.7 | 14.4 | 87 | 35 - 142 | |
| Aldrin | 16.7 | 15.2 | 91 | 52 - 130 | |
| alpha-BHC | 16.7 | 15.8 | 95 | 58 - 130 | |
| beta-BHC | 16.7 | 16.3 | 98 | 56 - 130 | |
| delta-BHC | 16.7 | 13.4 | 80 | 48 - 130 | |
| Dieldrin | 16.7 | 15.4 | 92 | 60 - 130 | |
| Endosulfan I | 16.7 | 15.3 | 92 | 59 - 130 | |
| Endosulfan II | 16.7 | 15.5 | 93 | 60 - 130 | |
| Endosulfan sulfate | 16.7 | 16.5 | 99 | 49 - 130 | |
| Endrin | 16.7 | 15.0 | 90 | 57 - 130 | |
| Endrin aldehyde | 16.7 | 13.3 | 80 | 57 - 130 | |
| Endrin ketone | 16.7 | 17.4 | 104 | 42 - 136 | |
| gamma-BHC (Lindane) | 16.7 | 16.0 | 96 | 58 - 130 | |
| Heptachlor | 16.7 | 17.0 | 102 | 55 - 130 | |
| Heptachlor epoxide | 16.7 | 15.2 | 91 | 59 - 130 | |
| Methoxychlor | 16.7 | 14.8 | 89 | 37 - 133 | |

| Surrogate | % Rec | Acceptance Limits |
|---|---|---|
| DCB Decachlorobiphenyl | 83 | 30 - 150 |
| Tetrachloro-m-xylene | 93 | 30 - 150 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Matrix Spike/**
**Matrix Spike Duplicate Recovery Report - Batch: 660-90841**

**Method: 8081A**
**Preparation: 3550B**

|  |  |  |  |  |  |
|---|---|---|---|---|---|
| MS Lab Sample ID: | 660-33863-3 | Analysis Batch: | 660-90917 | Instrument ID: | BSGJ |
| Client Matrix: | Solid | Prep Batch: | 660-90841 | Lab File ID: | 1B19J025.D |
| Dilution: | 1.0 |  |  | Initial Weight/Volume: | 30.05 g |
| Date Analyzed: | 02/19/2010 1654 |  |  | Final Weight/Volume: | 10 mL |
| Date Prepared: | 02/19/2010 0657 |  |  | Injection Volume: | 2 uL |
|  |  |  |  | Column ID: | PRIMARY |

|  |  |  |  |  |  |
|---|---|---|---|---|---|
| MSD Lab Sample ID: | 660-33863-3 | Analysis Batch: | 660-90917 | Instrument ID: | BSGJ |
| Client Matrix: | Solid | Prep Batch: | 660-90841 | Lab File ID: | 1B19J026.D |
| Dilution: | 1.0 |  |  | Initial Weight/Volume: | 30.05 g |
| Date Analyzed: | 02/19/2010 1708 |  |  | Final Weight/Volume: | 10 mL |
| Date Prepared: | 02/19/2010 0657 |  |  | Injection Volume: | 2 uL |
|  |  |  |  | Column ID: | PRIMARY |

|  | % Rec. |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| 4,4'-DDD | 92 | 89 | 62 - 130 | 3 | 50 |  |  |
| 4,4'-DDE | 62 | 62 | 60 - 130 | 0 | 25 |  |  |
| 4,4'-DDT | 31 | 28 | 35 - 142 | 13 | 26 | J3 | J3 |
| Aldrin | 51 | 50 | 52 - 130 | 2 | 38 | J3 | J3 |
| alpha-BHC | 71 | 72 | 58 - 130 | 1 | 40 |  |  |
| beta-BHC | 74 | 74 | 56 - 130 | 0 | 40 |  |  |
| delta-BHC | 78 | 78 | 48 - 130 | 0 | 47 |  |  |
| Dieldrin | 60 | 64 | 60 - 130 | 7 | 30 |  |  |
| Endosulfan I | 62 | 66 | 59 - 130 | 7 | 40 |  |  |
| Endosulfan II | 64 | 64 | 60 - 130 | 0 | 65 |  |  |
| Endosulfan sulfate | 81 | 81 | 49 - 130 | 1 | 50 |  |  |
| Endrin | 50 | 48 | 57 - 130 | 5 | 32 | J3 | J3 |
| Endrin aldehyde | 14 | 17 | 57 - 130 | 14 | 86 | J3 | J3 |
| Endrin ketone | 102 | 100 | 42 - 136 | 2 | 31 |  |  |
| gamma-BHC (Lindane) | 71 | 72 | 58 - 130 | 1 | 37 |  |  |
| Heptachlor | 61 | 57 | 55 - 130 | 6 | 38 |  |  |
| Heptachlor epoxide | 61 | 63 | 59 - 130 | 3 | 40 |  |  |
| Methoxychlor | 65 | 67 | 37 - 133 | 4 | 40 |  |  |

| Surrogate | MS % Rec | MSD % Rec | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 32 | 34 | 30 - 150 |
| Tetrachloro-m-xylene | 55 | 60 | 30 - 150 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Method Blank - Batch: 640-65758**

**Method: 8141A**
**Preparation: 3520C**

Lab Sample ID: MB 640-65758/1-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/23/2010 1701
Date Prepared: 02/18/2010 1430

Analysis Batch: 640-65935
Prep Batch: 640-65758
Units: ug/L

Instrument ID: SGF
Lab File ID: 1B23F35.d
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 5.0 mL
Injection Volume: 1 uL
Column ID: PRIMARY

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Azinphos-methyl | 0.33 | U | 0.33 | 1.0 |
| Bolstar | 0.095 | U | 0.095 | 1.0 |
| Chlorpyrifos | 0.11 | U | 0.11 | 1.0 |
| Coumaphos | 0.081 | U | 0.081 | 1.0 |
| Demeton, Total | 0.15 | U | 0.15 | 2.5 |
| Diazinon | 0.11 | U | 0.11 | 1.0 |
| Dichlorvos | 0.26 | U | 0.26 | 2.0 |
| Dimethoate | 0.32 | U | 0.32 | 2.0 |
| Disulfoton | 0.12 | U | 0.12 | 2.0 |
| EPN | 0.071 | U | 0.071 | 1.0 |
| Ethoprop | 0.41 | U | 0.41 | 0.50 |
| Fensulfothion | 0.17 | U | 0.17 | 5.0 |
| Hexazinone | 0.16 | U | 0.16 | 2.0 |
| Malathion | 0.092 | U | 0.092 | 1.0 |
| Merphos | 0.13 | U | 0.13 | 1.0 |
| Mevinphos | 0.15 | U | 0.15 | 2.0 |
| Ethyl Parathion | 0.080 | U | 0.080 | 1.0 |
| Monochrotophos | 2.6 | U | 2.6 | 10 |
| Methyl parathion | 0.12 | U | 0.12 | 0.50 |
| Naled | 0.36 | U | 0.36 | 5.0 |
| Phorate | 0.16 | U | 0.16 | 1.0 |
| Ronnel | 0.13 | U | 0.13 | 1.0 |
| Stirophos | 0.084 | U | 0.084 | 1.0 |
| Sulfotepp | 0.055 | U | 0.055 | 0.50 |
| Tokuthion | 0.087 | U | 0.087 | 1.0 |
| Trichloronate | 0.11 | U | 0.11 | 1.0 |

| Surrogate | % Rec | Acceptance Limits |
|---|---|---|
| Triphenylphosphate | 111 | 37 - 139 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

## Lab Control Sample/
## Lab Control Sample Duplicate Recovery Report - Batch: 640-65758

**Method: 8141A**
**Preparation: 3520C**

LCS Lab Sample ID: LCS 640-65758/2-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/23/2010 2145
Date Prepared: 02/18/2010 1430

Analysis Batch: 640-65935
Prep Batch: 640-65758
Units: ug/L

Instrument ID: SGF
Lab File ID: 1B23F55.d
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 5.0 mL
Injection Volume: 1 uL
Column ID: PRIMARY

LCSD Lab Sample ID: LCSD 640-65758/3-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/23/2010 2159
Date Prepared: 02/18/2010 1430

Analysis Batch: 640-65935
Prep Batch: 640-65758
Units: ug/L

Instrument ID: SGF
Lab File ID: 1B23F56.d
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 5.0 mL
Injection Volume: 1 uL
Column ID: PRIMARY

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | LCS | LCSD | Limit | RPD | RPD Limit | LCS Qual | LCSD Qual |
| Azinphos-methyl | 118 | 111 | 50 - 130 | 6 | 30 | | |
| Bolstar | 111 | 96 | 50 - 130 | 10 | 30 | | |
| Chlorpyrifos | 107 | 95 | 50 - 130 | 12 | 30 | | |
| Coumaphos | 115 | 115 | 50 - 130 | 0 | 30 | | |
| Demeton, Total | 61 | 60 | | 2 | | | |
| Diazinon | 111 | 99 | 42 - 132 | 8 | 30 | | |
| Dichlorvos | 133 | 119 | 50 - 130 | 11 | 30 | J3 | |
| EPN | 125 | 122 | 50 - 130 | 5 | 30 | | |
| Ethoprop | 112 | 105 | 50 - 130 | 2 | 30 | | |
| Fensulfothion | 107 | 97 | 50 - 130 | 10 | 30 | I | I |
| Malathion | 111 | 99 | 50 - 130 | 11 | 30 | | |
| Mevinphos | 111 | 100 | 50 - 130 | 4 | 30 | | |
| Ethyl Parathion | 116 | 103 | 49 - 134 | 12 | 30 | | |
| Monochrotophos | 42 | 44 | 50 - 130 | 5 | 30 | I J3 | I J3 |
| Methyl parathion | 118 | 103 | 43 - 140 | 14 | 30 | | |
| Naled | 64 | 60 | 50 - 130 | 5 | 30 | | |
| Phorate | 97 | 87 | 50 - 130 | 11 | 30 | | |
| Ronnel | 108 | 95 | 38 - 124 | 1 | 30 | | |
| Stirophos | 111 | 99 | 50 - 130 | 11 | 30 | | |
| Tokuthion | 109 | 97 | 50 - 130 | 11 | 30 | | |
| Trichloronate | 105 | 93 | 50 - 130 | 12 | 30 | | |

| Surrogate | LCS % Rec | LCSD % Rec | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 116 | 106 | 37 - 139 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Method Blank - Batch: 640-65855**

**Method: 8141A**
**Preparation: 3550B**

Lab Sample ID: MB 640-65855/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/24/2010 0831
Date Prepared: 02/22/2010 1006

Analysis Batch: 640-65935
Prep Batch: 640-65855
Units: ug/Kg

Instrument ID: SGF
Lab File ID: 1B23F63.d
Initial Weight/Volume: 00030.24 g
Final Weight/Volume: 10.0 mL
Injection Volume: 1 uL
Column ID: PRIMARY

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Azinphos-methyl | 4.4 | U | 4.4 | 65 |
| Bolstar | 8.4 | U | 8.4 | 33 |
| Chlorpyrifos | 8.3 | U | 8.3 | 33 |
| Coumaphos | 8.5 | U | 8.5 | 330 |
| Demeton, Total | 13 | U | 13 | 82 |
| Diazinon | 8.7 | U | 8.7 | 33 |
| Dichlorvos | 17 | U | 17 | 65 |
| Dimethoate | 9.9 | U | 9.9 | 65 |
| Disulfoton | 11 | U | 11 | 65 |
| EPN | 9.0 | U | 9.0 | 33 |
| Ethoprop | 15 | U | 15 | 17 |
| Fensulfothion | 9.9 | U | 9.9 | 330 |
| Hexazinone | 7.6 | U | 7.6 | 33 |
| Hexazinone | 7.6 | U | 7.6 | 33 |
| Malathion | 8.9 | U | 8.9 | 33 |
| Merphos | 8.2 | U | 8.2 | 33 |
| Mevinphos | 11 | U | 11 | 65 |
| Ethyl Parathion | 8.7 | U | 8.7 | 33 |
| Monochrotophos | 84 | U | 84 | 330 |
| Methyl parathion | 5.4 | U | 5.4 | 17 |
| Naled | 5.2 | U | 5.2 | 330 |
| Phorate | 11 | U | 11 | 33 |
| Ronnel | 7.9 | U | 7.9 | 33 |
| Stirophos | 8.8 | U | 8.8 | 33 |
| Sulfotepp | 5.3 | U | 5.3 | 17 |
| Tokuthion | 7.6 | U | 7.6 | 33 |
| Trichloronate | 8.1 | U | 8.1 | 330 |

| Surrogate | % Rec | Acceptance Limits |
|---|---|---|
| Triphenylphosphate | 94 | 35 - 134 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Lab Control Sample/**
**Lab Control Sample Duplicate Recovery Report - Batch: 640-65855**

**Method: 8141A**
**Preparation: 3550B**

| | | | | | |
|---|---|---|---|---|---|
| LCS Lab Sample ID: | LCS 640-65855/2-A | Analysis Batch: | 640-65935 | Instrument ID: | SGF |
| Client Matrix: | Solid | Prep Batch: | 640-65855 | Lab File ID: | 1B23F69.d |
| Dilution: | 1.0 | Units: | ug/Kg | Initial Weight/Volume: | 00030.07 g |
| Date Analyzed: | 02/24/2010 1004 | | | Final Weight/Volume: | 10.0 mL |
| Date Prepared: | 02/22/2010 1006 | | | Injection Volume: | 1 uL |
| | | | | Column ID: | PRIMARY |

| | | | | | |
|---|---|---|---|---|---|
| LCSD Lab Sample ID: | LCSD 640-65855/3-A | Analysis Batch: | 640-65935 | Instrument ID: | SGF |
| Client Matrix: | Solid | Prep Batch: | 640-65855 | Lab File ID: | 1B23F70.d |
| Dilution: | 1.0 | Units: | ug/Kg | Initial Weight/Volume: | 00030.36 g |
| Date Analyzed: | 02/24/2010 1018 | | | Final Weight/Volume: | 10.0 mL |
| Date Prepared: | 02/22/2010 1006 | | | Injection Volume: | 1 uL |
| | | | | Column ID: | PRIMARY |

| Analyte | % Rec.<br>LCS | <br>LCSD | Limit | RPD | RPD Limit | LCS Qual | LCSD Qual |
|---|---|---|---|---|---|---|---|
| Azinphos-methyl | 102 | 105 | 50 - 130 | 2 | 50 | | |
| Bolstar | 74 | 80 | 50 - 130 | 1 | 50 | | |
| Chlorpyrifos | 70 | 76 | 31 - 130 | 7 | 50 | | |
| Coumaphos | 87 | 88 | 50 - 130 | 1 | 50 | I | I |
| Demeton, Total | 65 | 70 | | 7 | | | |
| Diazinon | 68 | 73 | 20 - 100 | 6 | 50 | | |
| Dichlorvos | 76 | 82 | 50 - 130 | 7 | 50 | | |
| EPN | 103 | 109 | 50 - 130 | 4 | 50 | | |
| Ethoprop | 68 | 75 | 50 - 130 | 8 | 50 | | |
| Fensulfothion | 102 | 107 | 50 - 130 | 4 | 50 | I | I |
| Malathion | 72 | 77 | 50 - 130 | 6 | 50 | | |
| Mevinphos | 72 | 78 | 50 - 130 | 4 | 50 | | |
| Ethyl Parathion | 80 | 87 | 22 - 116 | 8 | 50 | | |
| Monochrotophos | 70 | 76 | 50 - 130 | 8 | 50 | | |
| Methyl parathion | 79 | 84 | 20 - 107 | 3 | 50 | | |
| Naled | 53 | 53 | 50 - 130 | 1 | 50 | | |
| Phorate | 66 | 72 | 50 - 130 | 0 | 50 | | |
| Ronnel | 69 | 74 | 38 - 130 | 6 | 50 | | |
| Stirophos | 79 | 85 | 50 - 130 | 2 | 50 | | |
| Tokuthion | 71 | 78 | 50 - 130 | 9 | 50 | | |
| Trichloronate | 68 | 75 | 50 - 130 | 1 | 50 | I | I |

| Surrogate | LCS % Rec | LCSD % Rec | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 79 | 80 | 35 - 134 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Matrix Spike/**
**Matrix Spike Duplicate Recovery Report - Batch: 640-65855**

**Method: 8141A**
**Preparation: 3550B**

MS Lab Sample ID: 400-45631-C-1-A MS
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/24/2010 0936
Date Prepared: 02/22/2010 1006

Analysis Batch: 640-65935
Prep Batch: 640-65855

Instrument ID: SGF
Lab File ID: 1B23F67.d
Initial Weight/Volume: 00030.26 g
Final Weight/Volume: 10.0 mL
Injection Volume: 1 uL
Column ID: PRIMARY

MSD Lab Sample ID: 400-45631-C-1-B MSD
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/24/2010 0950
Date Prepared: 02/22/2010 1006

Analysis Batch: 640-65935
Prep Batch: 640-65855

Instrument ID: SGF
Lab File ID: 1B23F68.d
Initial Weight/Volume: 00030.25 g
Final Weight/Volume: 10.0 mL
Injection Volume: 1 uL
Column ID: PRIMARY

| Analyte | % Rec.<br>MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
|---|---|---|---|---|---|---|---|
| Azinphos-methyl | 94 | 61 | 50 - 130 | 42 | 50 | | |
| Bolstar | 74 | 58 | 50 - 130 | 34 | 50 | | |
| Chlorpyrifos | 70 | 55 | 31 - 130 | 23 | 50 | | |
| Coumaphos | 93 | 64 | 50 - 130 | 37 | 50 | I | I |
| Demeton, Total | 52 | 35 | 50 - 130 | 38 | | | J3 |
| Diazinon | 62 | 46 | 20 - 100 | 29 | 50 | | |
| Dichlorvos | 56 | 36 | 50 - 130 | 44 | 50 | | I J3 |
| EPN | 106 | 78 | 50 - 130 | 31 | 50 | | |
| Ethoprop | 57 | 40 | 50 - 130 | 35 | 50 | | J3 |
| Fensulfothion | 58 | 55 | 50 - 130 | 6 | 50 | I | I |
| Malathion | 69 | 46 | 50 - 130 | 40 | 50 | | J3 |
| Mevinphos | 23 | 24 | 50 - 130 | 4 | 50 | I J3 | I J3 |
| Ethyl Parathion | 80 | 56 | 22 - 116 | 35 | 50 | | |
| Monochrotophos | 0 | 0 | 50 - 130 | NC | 50 | U J3 | U J3 |
| Methyl parathion | 72 | 49 | 20 - 107 | 43 | 50 | | |
| Naled | 36 | 20 | 50 - 130 | 63 | 50 | I J3 | I J3 |
| Phorate | 56 | 40 | 50 - 130 | 40 | 50 | | J3 |
| Ronnel | 67 | 51 | 38 - 130 | 26 | 50 | | |
| Stirophos | 76 | 52 | 50 - 130 | 38 | 50 | | |
| Tokuthion | 70 | 58 | 50 - 130 | 18 | 50 | | |
| Trichloronate | 67 | 55 | 50 - 130 | 25 | 50 | I | I |

| Surrogate | MS % Rec | MSD % Rec | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 74 | 51 | 35 - 134 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Method Blank - Batch: 660-90805**

**Method: 8151A**
**Preparation: 8151A**

Lab Sample ID: MB 660-90805/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/26/2010 0742
Date Prepared: 02/18/2010 1200

Analysis Batch: 660-91251
Prep Batch: 660-90805
Units: ug/Kg

Instrument ID: BSGJ
Lab File ID: 1B25J054.D
Initial Weight/Volume: 30.00 g
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Column ID: PRIMARY

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| 2,4,5-T | 10 | U | 10 | 50 |
| 2,4-D | 1.6 | U | 1.6 | 8.3 |
| 2,4-DB | 6.4 | U | 6.4 | 8.3 |
| Dalapon | 23 | U | 23 | 2000 |
| Dicamba | 12 | U | 12 | 50 |
| Dichlorprop | 25 | U | 25 | 100 |
| Dinoseb | 8.3 | U | 8.3 | 30 |
| MCPA | 740 | U | 740 | 2000 |
| MCPP | 400 | U | 400 | 2000 |
| Pentachlorophenol | 5.0 | U | 5.0 | 17 |
| Picloram | 1.2 | U | 1.2 | 3.3 |
| Silvex (2,4,5-TP) | 10 | U | 10 | 50 |

| Surrogate | % Rec | Acceptance Limits |
|---|---|---|
| 2,4-Dichlorophenylacetic acid | 60 | 10 - 135 |

## Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Lab Control Sample - Batch: 660-90805**

**Method: 8151A**
**Preparation: 8151A**

Lab Sample ID: LCS 660-90805/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/26/2010 0759
Date Prepared: 02/18/2010 1200

Analysis Batch: 660-91251
Prep Batch: 660-90805
Units: ug/Kg

Instrument ID: BSGJ
Lab File ID: 1B25J055.D
Initial Weight/Volume: 30.00 g
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Column ID: PRIMARY

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| 2,4,5-T | 83.3 | 71.6 | 86 | 27 - 168 | |
| 2,4-D | 83.3 | 73.6 | 88 | 26 - 159 | |
| 2,4-DB | 83.3 | 94.4 | 113 | 10 - 181 | |
| Dalapon | 83.3 | 61.1 | 73 | 10 - 213 | |
| Dicamba | 83.3 | 60.8 | 73 | 29 - 145 | |
| Dichlorprop | 83.3 | 61.8 | 74 | 28 - 130 | |
| Dinoseb | 83.3 | 44.1 | 53 | 10 - 130 | |
| MCPA | 8330 | 6360 | 76 | 29 - 134 | |
| MCPP | 8330 | 6480 | 78 | 13 - 157 | |
| Pentachlorophenol | 83.3 | 49.9 | 60 | 16 - 132 | |
| Picloram | 83.3 | 70.4 | 84 | 10 - 150 | |
| Silvex (2,4,5-TP) | 83.3 | 64.4 | 77 | 32 - 134 | |

| Surrogate | % Rec | Acceptance Limits |
|---|---|---|
| 2,4-Dichlorophenylacetic acid | 68 | 10 - 135 |

# Quality Control Results

Client: Environmental Engineering Consultant | Job Number: 660-33863-1

**Matrix Spike/**
**Matrix Spike Duplicate Recovery Report - Batch: 660-90805**

**Method: 8151A**
**Preparation: 8151A**

| | | | | | |
|---|---|---|---|---|---|
| MS Lab Sample ID: | 660-33863-4 | Analysis Batch: | 660-91251 | Instrument ID: | BSGJ |
| Client Matrix: | Solid | Prep Batch: | 660-90805 | Lab File ID: | 1B25J065.D |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 29.57 g |
| Date Analyzed: | 02/26/2010 1055 | | | Final Weight/Volume: | 10 mL |
| Date Prepared: | 02/18/2010 1200 | | | Injection Volume: | 2 uL |
| | | | | Column ID: | PRIMARY |

| | | | | | |
|---|---|---|---|---|---|
| MSD Lab Sample ID: | 660-33863-4 | Analysis Batch: | 660-91251 | Instrument ID: | BSGJ |
| Client Matrix: | Solid | Prep Batch: | 660-90805 | Lab File ID: | 1B25J066.D |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 29.57 g |
| Date Analyzed: | 02/26/2010 1113 | | | Final Weight/Volume: | 10 mL |
| Date Prepared: | 02/18/2010 1200 | | | Injection Volume: | 2 uL |
| | | | | Column ID: | PRIMARY |

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| 2,4,5-T | 73 | 78 | 27 - 168 | 6 | 59 | | |
| 2,4-D | 506 | 206 | 26 - 159 | 84 | 47 | J3 | J3 |
| 2,4-DB | 111 | 106 | 10 - 181 | 4 | 40 | | |
| Dalapon | 28 | 41 | 10 - 213 | 37 | 40 | | |
| Dicamba | 55 | 62 | 29 - 145 | 12 | 40 | | |
| Dichlorprop | 65 | 67 | 28 - 130 | 3 | 40 | | |
| Dinoseb | 87 | 72 | 10 - 130 | 18 | 50 | | |
| MCPA | 86 | 67 | 29 - 134 | 25 | 50 | | |
| MCPP | 93 | 59 | 13 - 157 | 45 | 50 | | |
| Pentachlorophenol | 71 | 64 | 16 - 132 | 10 | 40 | | |
| Picloram | 38 | 58 | 10 - 150 | 43 | 40 | | J3 |
| Silvex (2,4,5-TP) | 78 | 69 | 32 - 134 | 12 | 51 | | |

| Surrogate | MS % Rec | | MSD % Rec | | Acceptance Limits |
|---|---|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 1630 | L J1 | 490 | J1 | 10 - 135 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Method Blank - Batch: 660-90939**

**Method: 8151A**
**Preparation: 8151A**

Lab Sample ID: MB 660-90939/1-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/26/2010 0449
Date Prepared: 02/22/2010 1412

Analysis Batch: 660-91375
Prep Batch: 660-90939
Units: ug/L

Instrument ID: BSGJ
Lab File ID: 1B25J044.D
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Column ID: PRIMARY

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| 2,4,5-T | 1.0 | U | 1.0 | 5.0 |
| 2,4-D | 1.0 | U | 1.0 | 5.0 |
| 2,4-DB | 1.0 | U | 1.0 | 5.0 |
| Dalapon | 25 | U | 25 | 120 |
| Dicamba | 0.25 | U | 0.25 | 1.2 |
| Dichlorprop | 1.0 | U | 1.0 | 6.0 |
| Dinoseb | 1.0 | U | 1.0 | 6.0 |
| MCPA | 34 | U | 34 | 120 |
| MCPP | 35 | U | 35 | 120 |
| Pentachlorophenol | 0.085 | U | 0.085 | 1.0 |
| Picloram | 1.0 | U | 1.0 | 5.0 |
| Silvex (2,4,5-TP) | 1.0 | U | 1.0 | 5.0 |

| Surrogate | % Rec | Acceptance Limits |
|---|---|---|
| 2,4-Dichlorophenylacetic acid | 74 | 33 - 120 |

## Lab Control Sample/
## Lab Control Sample Duplicate Recovery Report - Batch: 660-90939

**Method: 8151A**
**Preparation: 8151A**

| | | | | | |
|---|---|---|---|---|---|
| LCS Lab Sample ID: | LCS 660-90939/2-A | Analysis Batch: | 660-91375 | Instrument ID: | BSGJ |
| Client Matrix: | Water | Prep Batch: | 660-90939 | Lab File ID: | 1B25J045.D |
| Dilution: | 1.0 | Units: | ug/L | Initial Weight/Volume: | 1000 mL |
| Date Analyzed: | 02/26/2010 0507 | | | Final Weight/Volume: | 10 mL |
| Date Prepared: | 02/22/2010 1412 | | | Injection Volume: | 2 uL |
| | | | | Column ID: | PRIMARY |

| | | | | | |
|---|---|---|---|---|---|
| LCSD Lab Sample ID: | LCSD 660-90939/3-A | Analysis Batch: | 660-91375 | Instrument ID: | BSGJ |
| Client Matrix: | Water | Prep Batch: | 660-90939 | Lab File ID: | 1B25J046.D |
| Dilution: | 1.0 | Units: | ug/L | Initial Weight/Volume: | 1000 mL |
| Date Analyzed: | 02/26/2010 0524 | | | Final Weight/Volume: | 10 mL |
| Date Prepared: | 02/22/2010 1412 | | | Injection Volume: | 2 uL |
| | | | | Column ID: | PRIMARY |

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | LCS | LCSD | Limit | RPD | RPD Limit | LCS Qual | LCSD Qual |
| 2,4,5-T | 81 | 84 | 50 - 130 | 4 | 48 | | |
| 2,4-D | 79 | 84 | 60 - 130 | 6 | 78 | | |
| 2,4-DB | 99 | 103 | 10 - 181 | 4 | 43 | | |
| Dalapon | 53 | 56 | 10 - 228 | 4 | 68 | | |
| Dicamba | 65 | 68 | 24 - 150 | 5 | 46 | | |
| Dichlorprop | 69 | 70 | 13 - 130 | 2 | 95 | | |
| Dinoseb | 77 | 79 | 10 - 130 | 3 | 115 | | |
| MCPA | 73 | 75 | 10 - 158 | 3 | 28 | | |
| MCPP | 77 | 79 | 10 - 214 | 3 | 78 | | |
| Pentachlorophenol | 56 | 57 | 25 - 134 | 2 | 34 | | |
| Picloram | 51 | 61 | 10 - 150 | 18 | 56 | | |
| Silvex (2,4,5-TP) | 73 | 77 | 33 - 130 | 6 | 66 | | |

| Surrogate | LCS % Rec | LCSD % Rec | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 61 | 63 | 33 - 120 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Method Blank - Batch: 660-90828**

**Method: 6010B**
**Preparation: 3050B**

Lab Sample ID: MB 660-90828/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/19/2010 1520
Date Prepared: 02/18/2010 1533

Analysis Batch: 660-90852
Prep Batch: 660-90828
Units: mg/Kg

Instrument ID: ICPA
Lab File ID: 10B19A
Initial Weight/Volume: 1.00 g
Final Weight/Volume: 50 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Aluminum | 5.8 | U | 5.8 | 20 |
| Arsenic | 0.23 | U | 0.23 | 0.50 |
| Boron | 0.59 | U | 0.59 | 5.0 |
| Barium | 0.16 | U | 0.16 | 1.0 |
| Calcium | 15 | U | 15 | 50 |
| Cadmium | 0.087 | U | 0.087 | 0.50 |
| Cobalt | 0.19 | U | 0.19 | 1.0 |
| Chromium | 0.17 | U | 0.17 | 1.0 |
| Copper | 0.50 | U | 0.50 | 2.0 |
| Iron | 3.0 | U | 3.0 | 5.0 |
| Magnesium | 6.8 | U | 6.8 | 50 |
| Manganese | 0.21 | U | 0.21 | 1.0 |
| Sodium | 18 | U | 18 | 50 |
| Lead | 0.15 | U | 0.15 | 0.50 |
| Strontium | 0.098 | U | 0.098 | 1.0 |
| Titanium | 0.30 | U | 0.30 | 1.0 |
| Vanadium | 0.11 | U | 0.11 | 1.0 |
| Zinc | 0.50 | U | 0.50 | 2.0 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Lab Control Sample - Batch: 660-90828**

**Method: 6010B**
**Preparation: 3050B**

Lab Sample ID: LCS 660-90828/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/19/2010 1526
Date Prepared: 02/18/2010 1533

Analysis Batch: 660-90852
Prep Batch: 660-90828
Units: mg/Kg

Instrument ID: ICPA
Lab File ID: 10B19A
Initial Weight/Volume: 1.00 g
Final Weight/Volume: 50 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Aluminum | 50.0 | 48.6 | 97 | 75 - 125 | |
| Arsenic | 50.0 | 50.1 | 100 | 75 - 125 | |
| Boron | 50.0 | 48.5 | 97 | 75 - 125 | |
| Barium | 50.0 | 50.1 | 100 | 75 - 125 | |
| Calcium | 50.0 | 53.2 | 106 | 75 - 125 | |
| Cadmium | 50.0 | 52.8 | 106 | 75 - 125 | |
| Cobalt | 50.0 | 49.6 | 99 | 75 - 125 | |
| Chromium | 49.5 | 49.8 | 101 | 75 - 125 | |
| Copper | 50.0 | 49.8 | 100 | 75 - 125 | |
| Iron | 50.0 | 51.0 | 102 | 75 - 125 | |
| Magnesium | 50.0 | 48.9 | 98 | 75 - 125 | |
| Manganese | 50.0 | 51.9 | 104 | 75 - 125 | |
| Sodium | 500 | 495 | 99 | 75 - 125 | |
| Lead | 50.0 | 52.1 | 104 | 75 - 125 | |
| Strontium | 50.0 | 51.5 | 103 | 75 - 125 | |
| Titanium | 50.0 | 50.7 | 101 | 75 - 125 | |
| Vanadium | 50.0 | 49.9 | 100 | 75 - 125 | |
| Zinc | 50.0 | 51.5 | 103 | 75 - 125 | |

## Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Matrix Spike/**
**Matrix Spike Duplicate Recovery Report - Batch: 660-90828**

**Method: 6010B**
**Preparation: 3050B**

| | | | | | |
|---|---|---|---|---|---|
| MS Lab Sample ID: | 660-33889-B-1-B MS | Analysis Batch: | 660-90852 | Instrument ID: | ICPA |
| Client Matrix: | Solid | Prep Batch: | 660-90828 | Lab File ID: | 10B19A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 1.03 g |
| Date Analyzed: | 02/19/2010 1544 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/18/2010 1533 | | | | |

| | | | | | |
|---|---|---|---|---|---|
| MSD Lab Sample ID: | 660-33889-B-1-C MSD | Analysis Batch: | 660-90852 | Instrument ID: | ICPA |
| Client Matrix: | Solid | Prep Batch: | 660-90828 | Lab File ID: | 10B19A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 1.00 g |
| Date Analyzed: | 02/19/2010 1550 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/18/2010 1533 | | | | |

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Aluminum | 153 | 490 | 75 - 125 | 8 | 20 | J3 | J3 |
| Arsenic | 78 | 76 | 75 - 125 | 1 | 20 | | |
| Boron | 76 | 75 | 75 - 125 | 2 | 20 | | |
| Barium | 78 | 79 | 75 - 125 | 3 | 20 | | |
| Calcium | -2840 | 1750 | 75 - 125 | 8 | 20 | J3 | J3 |
| Cadmium | 77 | 75 | 75 - 125 | 0 | 20 | | |
| Cobalt | 73 | 71 | 75 - 125 | 0 | 20 | J3 | J3 |
| Chromium | 73 | 73 | 75 - 125 | 2 | 20 | J3 | J3 |
| Copper | 79 | 78 | 75 - 125 | 2 | 20 | | |
| Iron | -91 | 107 | 75 - 125 | 10 | 20 | J3 | |
| Magnesium | 53 | 62 | 75 - 125 | 3 | 20 | J3 | J3 |
| Manganese | 75 | 76 | 75 - 125 | 3 | 20 | | |
| Sodium | 81 | 86 | 75 - 125 | 5 | 20 | | |
| Lead | 77 | 76 | 75 - 125 | 1 | 20 | | |
| Strontium | 71 | 80 | 75 - 125 | 5 | 20 | J3 | |
| Titanium | 74 | 78 | 75 - 125 | 5 | 20 | J3 | |
| Vanadium | 75 | 75 | 75 - 125 | 2 | 20 | | |
| Zinc | 72 | 71 | 75 - 125 | 2 | 20 | J3 | J3 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

## Method Blank - Batch: 660-90946

**Method: 6010B**
**Preparation: 3005A**
**Total Recoverable**

Lab Sample ID: MB 660-90946/1-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/01/2010 1546
Date Prepared: 02/22/2010 1600

Analysis Batch: 660-91239
Prep Batch: 660-90946
Units: mg/L

Instrument ID: ICPA
Lab File ID: 10C01A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Potassium | 0.19 | U | 0.19 | 1.0 |
| Copper | 0.0029 | U | 0.0029 | 0.010 |
| Iron | 0.050 | U | 0.050 | 0.20 |
| Magnesium | 0.020 | U | 0.020 | 0.080 |
| Sodium | 0.31 | U | 0.31 | 0.50 |
| Lead | 0.0020 | U | 0.0020 | 0.010 |
| Zinc | 0.0050 | U | 0.0050 | 0.020 |

## Lab Control Sample - Batch: 660-90946

**Method: 6010B**
**Preparation: 3005A**
**Total Recoverable**

Lab Sample ID: LCS 660-90946/2-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/01/2010 1552
Date Prepared: 02/22/2010 1600

Analysis Batch: 660-91239
Prep Batch: 660-90946
Units: mg/L

Instrument ID: ICPA
Lab File ID: 10C01A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Potassium | 10.0 | 10.4 | 103 | 75 - 125 | |
| Copper | 1.00 | 0.988 | 99 | 75 - 125 | |
| Iron | 1.00 | 1.01 | 101 | 75 - 125 | |
| Magnesium | 1.00 | 1.00 | 100 | 75 - 125 | |
| Sodium | 10.0 | 10.2 | 102 | 75 - 125 | |
| Lead | 1.00 | 1.03 | 103 | 75 - 125 | |
| Zinc | 1.00 | 1.02 | 102 | 75 - 125 | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Matrix Spike/**
**Matrix Spike Duplicate Recovery Report - Batch: 660-90946**

**Method: 6010B**
**Preparation: 3005A**
**Total Recoverable**

MS Lab Sample ID: 660-33845-B-1-B MS
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/01/2010 1610
Date Prepared: 02/22/2010 1600

Analysis Batch: 660-91239
Prep Batch: 660-90946

Instrument ID: ICPA
Lab File ID: 10C01A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

---

MSD Lab Sample ID: 660-33845-B-1-C MSD
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/01/2010 1616
Date Prepared: 02/22/2010 1600

Analysis Batch: 660-91239
Prep Batch: 660-90946

Instrument ID: ICPA
Lab File ID: 10C01A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

|  | % Rec. |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Potassium | 115 | 110 | 75 - 125 | 3 | 20 |  |  |
| Copper | 100 | 99 | 75 - 125 | 1 | 20 |  |  |
| Iron | 102 | 105 | 75 - 125 | 2 | 20 |  |  |
| Magnesium | 118 | 117 | 75 - 125 | 0 | 20 |  |  |
| Sodium | 86 | 112 | 75 - 125 | 7 | 20 |  |  |
| Lead | 103 | 105 | 75 - 125 | 2 | 20 |  |  |
| Zinc | 102 | 105 | 75 - 125 | 3 | 20 |  |  |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

## Method Blank - Batch: 660-91263

**Method: 6010B**
**Preparation: 3005A**
**Total Recoverable**

Lab Sample ID: MB 660-91263/1-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/02/2010 1646
Date Prepared: 03/02/2010 1030

Analysis Batch: 660-91268
Prep Batch: 660-91263
Units: mg/L

Instrument ID: ICPA
Lab File ID: 10C02A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Potassium | 0.19 | U | 0.19 | 1.0 |
| Copper | 0.0029 | U | 0.0029 | 0.010 |
| Iron | 0.050 | U | 0.050 | 0.20 |
| Magnesium | 0.020 | U | 0.020 | 0.080 |
| Sodium | 0.31 | U | 0.31 | 0.50 |
| Lead | 0.0020 | U | 0.0020 | 0.010 |
| Zinc | 0.0050 | U | 0.0050 | 0.020 |

## Lab Control Sample - Batch: 660-91263

**Method: 6010B**
**Preparation: 3005A**
**Total Recoverable**

Lab Sample ID: LCS 660-91263/2-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/02/2010 1652
Date Prepared: 03/02/2010 1030

Analysis Batch: 660-91268
Prep Batch: 660-91263
Units: mg/L

Instrument ID: ICPA
Lab File ID: 10C02A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Potassium | 10.0 | 8.90 | 89 | 75 - 125 | |
| Copper | 1.00 | 0.966 | 97 | 75 - 125 | |
| Iron | 1.00 | 0.959 | 96 | 75 - 125 | |
| Magnesium | 1.00 | 0.943 | 94 | 75 - 125 | |
| Sodium | 10.0 | 9.55 | 96 | 75 - 125 | |
| Lead | 1.00 | 0.973 | 97 | 75 - 125 | |
| Zinc | 1.00 | 0.956 | 96 | 75 - 125 | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Matrix Spike/**
**Matrix Spike Duplicate Recovery Report - Batch: 660-91263**

**Method: 6010B**
**Preparation: 3005A**
**Total Recoverable**

MS Lab Sample ID: 660-34028-E-1-C MS
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/02/2010 1741
Date Prepared: 03/02/2010 1030

Analysis Batch: 660-91268
Prep Batch: 660-91263

Instrument ID: ICPA
Lab File ID: 10C02A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

MSD Lab Sample ID: 660-34028-E-1-D MSD
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/02/2010 1747
Date Prepared: 03/02/2010 1030

Analysis Batch: 660-91268
Prep Batch: 660-91263

Instrument ID: ICPA
Lab File ID: 10C02A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

|  | % Rec. |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Potassium | 103 | 99 | 75 - 125 | 4 | 20 |  |  |
| Copper | 100 | 96 | 75 - 125 | 4 | 20 |  |  |
| Iron | 102 | 99 | 75 - 125 | 3 | 20 |  |  |
| Magnesium | 214 | 128 | 75 - 125 | 3 | 20 | J3 | J3 |
| Sodium | 123 | 107 | 75 - 125 | 4 | 20 |  |  |
| Lead | 98 | 96 | 75 - 125 | 2 | 20 |  |  |
| Zinc | 95 | 94 | 75 - 125 | 1 | 20 |  |  |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

## Method Blank - Batch: 660-90800

**Method: 7470A**
**Preparation: 7470A**

Lab Sample ID: MB 660-90800/1-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/18/2010 1248
Date Prepared: 02/18/2010 0900

Analysis Batch: 660-90825
Prep Batch: 660-90800
Units: mg/L

Instrument ID: PS200II
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 1.0 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Mercury | 0.000072 | U | 0.000072 | 0.00020 |

## Lab Control Sample - Batch: 660-90800

**Method: 7470A**
**Preparation: 7470A**

Lab Sample ID: LCS 660-90800/2-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/18/2010 1253
Date Prepared: 02/18/2010 0900

Analysis Batch: 660-90825
Prep Batch: 660-90800
Units: mg/L

Instrument ID: PS200II
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Mercury | 0.00100 | 0.00103 | 103 | 80 - 120 | |

## Matrix Spike/ Matrix Spike Duplicate Recovery Report - Batch: 660-90800

**Method: 7470A**
**Preparation: 7470A**

MS Lab Sample ID: 660-33863-6
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/18/2010 1335
Date Prepared: 02/18/2010 0900

Analysis Batch: 660-90825
Prep Batch: 660-90800

Instrument ID: PS200II
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

MSD Lab Sample ID: 660-33863-6
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/18/2010 1338
Date Prepared: 02/18/2010 0900

Analysis Batch: 660-90825
Prep Batch: 660-90800

Instrument ID: PS200II
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Mercury | 108 | 105 | 80 - 120 | 3 | 20 | | |

## Method Blank - Batch: 660-91390

**Method: 7471A**
**Preparation: 7471A**

| | | | | | |
|---|---|---|---|---|---|
| Lab Sample ID: | MB 660-91390/1-A | Analysis Batch: | 660-91412 | Instrument ID: | PS200II |
| Client Matrix: | Solid | Prep Batch: | 660-91390 | Lab File ID: | N/A |
| Dilution: | 1.0 | Units: | mg/Kg | Initial Weight/Volume: | 0.30 g |
| Date Analyzed: | 03/04/2010 1357 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 03/04/2010 1100 | | | | |

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Mercury | 0.0075 | U | 0.0075 | 0.020 |

## Lab Control Sample - Batch: 660-91390

**Method: 7471A**
**Preparation: 7471A**

| | | | | | |
|---|---|---|---|---|---|
| Lab Sample ID: | LCS 660-91390/2-A | Analysis Batch: | 660-91412 | Instrument ID: | PS200II |
| Client Matrix: | Solid | Prep Batch: | 660-91390 | Lab File ID: | N/A |
| Dilution: | 1.0 | Units: | mg/Kg | Initial Weight/Volume: | 0.30 g |
| Date Analyzed: | 03/04/2010 1400 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 03/04/2010 1100 | | | | |

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Mercury | 0.167 | 0.188 | 113 | 80 - 120 | |

## Matrix Spike/ Matrix Spike Duplicate Recovery Report - Batch: 660-91390

**Method: 7471A**
**Preparation: 7471A**

| | | | | | |
|---|---|---|---|---|---|
| MS Lab Sample ID: | 660-34106-A-2-B MS | Analysis Batch: | 660-91412 | Instrument ID: | PS200II |
| Client Matrix: | Solid | Prep Batch: | 660-91390 | Lab File ID: | N/A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 0.30 g |
| Date Analyzed: | 03/04/2010 1449 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 03/04/2010 1100 | | | | |

| | | | | | |
|---|---|---|---|---|---|
| MSD Lab Sample ID: | 660-34106-A-2-C MSD | Analysis Batch: | 660-91412 | Instrument ID: | PS200II |
| Client Matrix: | Solid | Prep Batch: | 660-91390 | Lab File ID: | N/A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 0.30 g |
| Date Analyzed: | 03/04/2010 1451 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 03/04/2010 1100 | | | | |

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Mercury | 109 | 136 | 80 - 120 | 14 | 20 | | J3 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

## Method Blank - Batch: 660-90880

**Method: 180.1**
**Preparation: N/A**

Lab Sample ID: MB 660-90880/3
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/18/2010 2100
Date Prepared: N/A

Analysis Batch: 660-90880
Prep Batch: N/A
Units: NTU

Instrument ID: Turbidity2
Lab File ID: N/A
Initial Weight/Volume:
Final Weight/Volume: 30 mL

| Analyte | Result | Qual | PQL | PQL |
|---|---|---|---|---|
| Turbidity | 0.10 | U | 0.10 | 0.10 |

## Lab Control Sample - Batch: 660-90880

**Method: 180.1**
**Preparation: N/A**

Lab Sample ID: LCS 660-90880/4
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/18/2010 2100
Date Prepared: N/A

Analysis Batch: 660-90880
Prep Batch: N/A
Units: NTU

Instrument ID: Turbidity2
Lab File ID: N/A
Initial Weight/Volume:
Final Weight/Volume: 30 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Turbidity | 40.0 | 39.7 | 99 | 90 - 110 | |

## Duplicate - Batch: 660-90880

**Method: 180.1**
**Preparation: N/A**

Lab Sample ID: 660-33863-5
Client Matrix: Water
Dilution: 2.0
Date Analyzed: 02/18/2010 2100
Date Prepared: N/A

Analysis Batch: 660-90880
Prep Batch: N/A
Units: NTU

Instrument ID: Turbidity2
Lab File ID: N/A
Initial Weight/Volume:
Final Weight/Volume: 30 mL

| Analyte | Sample Result/Qual | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|
| Turbidity | 45 | 46.4 | 4 | 20 | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Method Blank - Batch: 680-161659**

**Method: 350.1**
**Preparation: 3-154**

|  |  |  |  |  |  |
|---|---|---|---|---|---|
| Lab Sample ID: | MB 680-161659/1-A | Analysis Batch: | 680-161811 | Instrument ID: | KONELAB1 |
| Client Matrix: | Solid | Prep Batch: | 680-161659 | Lab File ID: | N/A |
| Dilution: | 1.0 | Units: | mg/Kg | Initial Weight/Volume: | 20.05 g |
| Date Analyzed: | 02/26/2010 1111 |  |  | Final Weight/Volume: | 100 mL |
| Date Prepared: | 02/25/2010 1234 |  |  |  |  |

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Ammonia (as N) | 0.13 | U | 0.13 | 0.30 |

**Lab Control Sample - Batch: 680-161659**

**Method: 350.1**
**Preparation: 3-154**

|  |  |  |  |  |  |
|---|---|---|---|---|---|
| Lab Sample ID: | LCS 680-161659/2-A | Analysis Batch: | 680-161811 | Instrument ID: | KONELAB1 |
| Client Matrix: | Solid | Prep Batch: | 680-161659 | Lab File ID: | N/A |
| Dilution: | 1.0 | Units: | mg/Kg | Initial Weight/Volume: | 19.95 g |
| Date Analyzed: | 02/26/2010 1111 |  |  | Final Weight/Volume: | 100 mL |
| Date Prepared: | 02/25/2010 1234 |  |  |  |  |

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Ammonia (as N) | 5.01 | 4.94 | 99 | 75 - 125 |  |

**Matrix Spike/**
**Matrix Spike Duplicate Recovery Report - Batch: 680-161659**

**Method: 350.1**
**Preparation: 3-154**

|  |  |  |  |  |  |
|---|---|---|---|---|---|
| MS Lab Sample ID: | 660-33863-2 | Analysis Batch: | 680-161811 | Instrument ID: | KONELAB1 |
| Client Matrix: | Solid | Prep Batch: | 680-161659 | Lab File ID: | N/A |
| Dilution: | 10 |  |  | Initial Weight/Volume: | 19.99 g |
| Date Analyzed: | 02/26/2010 1159 |  |  | Final Weight/Volume: | 100 mL |
| Date Prepared: | 02/25/2010 1234 |  |  |  |  |

|  |  |  |  |  |  |
|---|---|---|---|---|---|
| MSD Lab Sample ID: | 660-33863-2 | Analysis Batch: | 680-161811 | Instrument ID: | KONELAB1 |
| Client Matrix: | Solid | Prep Batch: | 680-161659 | Lab File ID: | N/A |
| Dilution: | 10 |  |  | Initial Weight/Volume: | 20.00 g |
| Date Analyzed: | 02/26/2010 1159 |  |  | Final Weight/Volume: | 100 mL |
| Date Prepared: | 02/25/2010 1234 |  |  |  |  |

|  | % Rec. |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Ammonia (as N) | 42 | 73 | 75 - 125 | 3 | 30 | J3 | J3 |

## Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Duplicate - Batch: 680-161659**

**Method: 350.1**
**Preparation: 3-154**

Lab Sample ID: 660-33914-D-8-B DU
Client Matrix: Solid
Dilution: 2.0
Date Analyzed: 02/26/2010 1148
Date Prepared: 02/25/2010 1234

Analysis Batch: 680-161811
Prep Batch: 680-161659
Units: mg/Kg

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 20.06 g
Final Weight/Volume: 100 mL

| Analyte | Sample Result/Qual | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|
| Ammonia (as N) | 9.3 | 11.1 | 17 | 30 | |

## Quality Control Results

Client: Environmental Engineering Consultant　　Job Number: 660-33863-1

### Method Blank - Batch: 660-90798

**Method: 353.2**
**Preparation: N/A**

Lab Sample ID: MB 660-90798/1
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/17/2010 1000
Date Prepared: N/A

Analysis Batch: 660-90798
Prep Batch: N/A
Units: mg/L

Instrument ID: LACHAT
Lab File ID: N/A
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Nitrate Nitrite as N | 0.10 | U | 0.10 | 0.50 |
| Nitrite as N | 0.10 | U | 0.10 | 0.50 |
| Nitrate as N | 0.10 | U | 0.10 | 0.50 |

### Lab Control Sample - Batch: 660-90798

**Method: 353.2**
**Preparation: N/A**

Lab Sample ID: LCS 660-90798/2
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/17/2010 1000
Date Prepared: N/A

Analysis Batch: 660-90798
Prep Batch: N/A
Units: mg/L

Instrument ID: LACHAT
Lab File ID: N/A
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Nitrate Nitrite as N | 1.00 | 0.976 | 98 | 90 - 110 | |
| Nitrite as N | 1.00 | 0.991 | 99 | 90 - 110 | |

## Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Matrix Spike/**
**Matrix Spike Duplicate Recovery Report - Batch: 660-90798**

**Method: 353.2**
**Preparation: N/A**

MS Lab Sample ID: 660-33863-5
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/17/2010 1242
Date Prepared: N/A

Analysis Batch: 660-90798
Prep Batch: N/A

Instrument ID: LACHAT
Lab File ID: N/A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

---

MSD Lab Sample ID: 660-33863-5
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/17/2010 1242
Date Prepared: N/A

Analysis Batch: 660-90798
Prep Batch: N/A

Instrument ID: LACHAT
Lab File ID: N/A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Nitrate Nitrite as N | 90 | 90 | 90 - 110 | 0 | 30 | | |
| Nitrite as N | 96 | 104 | 90 - 110 | 8 | 30 | | |

## Method Blank - Batch: 660-91352

**Method: 353.2**
**Preparation: N/A**

Lab Sample ID: MB 660-91350/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/03/2010 0939
Date Prepared: N/A
Date Leached: 03/01/2010 1600

Analysis Batch: 660-91352
Prep Batch: N/A
Units: mg/Kg
Leachate Batch: 660-91350

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Nitrate Nitrite as N-Soluble | 1.0 | U | 1.0 | 5.0 |
| Nitrite as N-Soluble | 1.0 | U | 1.0 | 5.0 |
| Nitrate as N-Soluble | 1.0 | U | 1.0 | 5.0 |

## Lab Control Sample - Batch: 660-91352

**Method: 353.2**
**Preparation: N/A**

Lab Sample ID: LCS 660-91350/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/03/2010 0939
Date Prepared: N/A
Date Leached: 03/01/2010 1600

Analysis Batch: 660-91352
Prep Batch: N/A
Units: mg/Kg
Leachate Batch: 660-91350

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Nitrate Nitrite as N-Soluble | 10.0 | 9.80 | 98 | 90 - 110 | |
| Nitrite as N-Soluble | 10.0 | 9.46 | 95 | 90 - 110 | |

## Matrix Spike/
## Matrix Spike Duplicate Recovery Report - Batch: 660-91352

**Method: 353.2**
**Preparation: N/A**

MS Lab Sample ID: 660-33863-1
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/03/2010 0939
Date Prepared: N/A
Date Leached: 03/01/2010 1600

Analysis Batch: 660-91352
Prep Batch: N/A
Leachate Batch: 660-91350

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

---

MSD Lab Sample ID: 660-33863-1
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/03/2010 0939
Date Prepared: N/A
Date Leached: 03/01/2010 1600

Analysis Batch: 660-91352
Prep Batch: N/A
Leachate Batch: 660-91350

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Nitrate Nitrite as N-Soluble | 106 | 107 | 90 - 110 | 1 | 20 | | |
| Nitrite as N-Soluble | 110 | 105 | 90 - 110 | 5 | 20 | | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

## Method Blank - Batch: 680-161349

**Method: 365.4**
**Preparation: 365.2/365.3/365**

Lab Sample ID: MB 680-161349/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/24/2010 1400
Date Prepared: 02/22/2010 1258

Analysis Batch: 680-161565
Prep Batch: 680-161349
Units: mg/Kg

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 0.200 g
Final Weight/Volume: 40 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Phosphorus, Total | 11 | U | 11 | 20 |

## Lab Control Sample/ Lab Control Sample Duplicate Recovery Report - Batch: 680-161349

**Method: 365.4**
**Preparation: 365.2/365.3/365**

LCS Lab Sample ID: LCS 680-161349/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/24/2010 1400
Date Prepared: 02/22/2010 1258

Analysis Batch: 680-161565
Prep Batch: 680-161349
Units: mg/Kg

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 0.200 g
Final Weight/Volume: 40 mL

LCSD Lab Sample ID: LCSD 680-161349/3-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/24/2010 1400
Date Prepared: 02/22/2010 1258

Analysis Batch: 680-161565
Prep Batch: 680-161349
Units: mg/Kg

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 0.200 g
Final Weight/Volume: 40 mL

|  | % Rec. |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|
| Analyte | LCS | LCSD | Limit | RPD | RPD Limit | LCS Qual | LCSD Qual |
| Phosphorus, Total | 95 | 97 | 60 - 140 | 3 | 40 |  |  |

## Duplicate - Batch: 680-161349

**Method: 365.4**
**Preparation: 365.2/365.3/365**

Lab Sample ID: 660-33914-E-11-B DU
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/24/2010 1417
Date Prepared: 02/22/2010 1258

Analysis Batch: 680-161565
Prep Batch: 680-161349
Units: mg/Kg

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 0.2395 g
Final Weight/Volume: 40 mL

| Analyte | Sample Result/Qual | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|
| Phosphorus, Total | 270 | 432 | 45 | 40 | J3 |

## Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

### Method Blank - Batch: 660-91206

**Method: 365.4**
**Preparation: 365.2/365.3/365**

Lab Sample ID: MB 660-91206/10-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/02/2010 0939
Date Prepared: 03/01/2010 1300

Analysis Batch: 660-91269
Prep Batch: 660-91206
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 20 mL
Final Weight/Volume: 20 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Phosphorus, Total | 0.10 | U | 0.10 | 0.30 |

### Lab Control Sample - Batch: 660-91206

**Method: 365.4**
**Preparation: 365.2/365.3/365**

Lab Sample ID: LCS 660-91206/11-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/02/2010 0939
Date Prepared: 03/01/2010 1300

Analysis Batch: 660-91269
Prep Batch: 660-91206
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 20 mL
Final Weight/Volume: 20 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Phosphorus, Total | 3.00 | 3.11 | 104 | 90 - 110 | |

### Matrix Spike/
### Matrix Spike Duplicate Recovery Report - Batch: 660-91206

**Method: 365.4**
**Preparation: 365.2/365.3/365**

MS Lab Sample ID: 660-33863-7
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/02/2010 0939
Date Prepared: 03/01/2010 1300

Analysis Batch: 660-91269
Prep Batch: 660-91206

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 20 mL
Final Weight/Volume: 20 mL

MSD Lab Sample ID: 660-33863-7
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/02/2010 0939
Date Prepared: 03/01/2010 1300

Analysis Batch: 660-91269
Prep Batch: 660-91206

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 20 mL
Final Weight/Volume: 20 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Phosphorus, Total | 118 | 117 | 90 - 110 | 0 | 30 | J3 | J3 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

## Method Blank - Batch: 680-161395

**Method: 9034**
**Preparation: 9030B**

Lab Sample ID: MB 680-161395/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/23/2010 1430
Date Prepared: 02/23/2010 1144

Analysis Batch: 680-161436
Prep Batch: 680-161395
Units: mg/Kg

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 10.00 g
Final Weight/Volume: 250 mL

| Analyte | Result | Qual | PQL | PQL |
|---|---|---|---|---|
| Sulfide | 25 | U | 25 | 25 |

## Lab Control Sample - Batch: 680-161395

**Method: 9034**
**Preparation: 9030B**

Lab Sample ID: LCS 680-161395/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/23/2010 1430
Date Prepared: 02/23/2010 1144

Analysis Batch: 680-161436
Prep Batch: 680-161395
Units: mg/Kg

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 10.00 g
Final Weight/Volume: 250 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Sulfide | 252 | 207 | 82 | 50 - 150 | |

## Matrix Spike/ Matrix Spike Duplicate Recovery Report - Batch: 680-161395

**Method: 9034**
**Preparation: 9030B**

MS Lab Sample ID: 660-33863-4
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/23/2010 1430
Date Prepared: 02/23/2010 1144

Analysis Batch: 680-161436
Prep Batch: 680-161395

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 10.03 g
Final Weight/Volume: 250 mL

MSD Lab Sample ID: 660-33863-4
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/23/2010 1430
Date Prepared: 02/23/2010 1144

Analysis Batch: 680-161436
Prep Batch: 680-161395

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 10.03 g
Final Weight/Volume: 250 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Sulfide | 84 | 83 | 50 - 150 | 2 | 50 | | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

## Method Blank - Batch: 680-162106

**Method: 9038**
**Preparation: N/A**

Lab Sample ID: MB 680-162053/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/02/2010 1707
Date Prepared: N/A
Date Leached: 03/02/2010 1138

Analysis Batch: 680-162106
Prep Batch: N/A
Units: mg/Kg
Leachate Batch: 680-162053

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL

| Analyte | Result | Qual | PQL | PQL |
|---|---|---|---|---|
| Sulfate-Soluble | 100 | U | 100 | 100 |

## Lab Control Sample/
## Lab Control Sample Duplicate Recovery Report - Batch: 680-162106

**Method: 9038**
**Preparation: N/A**

LCS Lab Sample ID: LCS 680-162053/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/02/2010 1707
Date Prepared: N/A
Date Leached: 03/02/2010 1138

Analysis Batch: 680-162106
Prep Batch: N/A
Units: mg/Kg
Leachate Batch: 680-162053

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL

LCSD Lab Sample ID: LCSD 680-162053/3-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/02/2010 1707
Date Prepared: N/A
Date Leached: 03/02/2010 1138

Analysis Batch: 680-162106
Prep Batch: N/A
Units: mg/Kg
Leachate Batch: 680-162053

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL

|  | % Rec. |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|
| Analyte | LCS | LCSD | Limit | RPD | RPD Limit | LCS Qual | LCSD Qual |
| Sulfate-Soluble | 100 | 100 | 75 - 125 | 0 | 30 |  |  |

### Matrix Spike/ Matrix Spike Duplicate Recovery Report - Batch: 680-162106

**Method: 9038**
**Preparation: N/A**

|  |  |  |  |  |  |
|---|---|---|---|---|---|
| MS Lab Sample ID: | 660-33863-1 | Analysis Batch: | 680-162106 | Instrument ID: | KONELAB1 |
| Client Matrix: | Solid | Prep Batch: | N/A | Lab File ID: | N/A |
| Dilution: | 1.0 |  |  | Initial Weight/Volume: | 1.0 mL |
| Date Analyzed: | 03/02/2010 1709 |  |  | Final Weight/Volume: | 1.0 mL |
| Date Prepared: | N/A |  |  |  |  |
| Date Leached: | 03/02/2010 1138 | Leachate Batch: | 680-162053 |  |  |

|  |  |  |  |  |  |
|---|---|---|---|---|---|
| MSD Lab Sample ID: | 660-33863-1 | Analysis Batch: | 680-162106 | Instrument ID: | KONELAB1 |
| Client Matrix: | Solid | Prep Batch: | N/A | Lab File ID: | N/A |
| Dilution: | 1.0 |  |  | Initial Weight/Volume: | 1.0 mL |
| Date Analyzed: | 03/02/2010 1709 |  |  | Final Weight/Volume: | 1.0 mL |
| Date Prepared: | N/A |  |  |  |  |
| Date Leached: | 03/02/2010 1138 | Leachate Batch: | 680-162053 |  |  |

|  | % Rec. |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Sulfate-Soluble | 119 | 113 | 75 - 125 | 7 | 30 |  |  |

### Duplicate - Batch: 680-162106

**Method: 9038**
**Preparation: N/A**

|  |  |  |  |  |  |
|---|---|---|---|---|---|
| Lab Sample ID: | 660-33914-D-11-C DU | Analysis Batch: | 680-162106 | Instrument ID: | KONELAB1 |
| Client Matrix: | Solid | Prep Batch: | N/A | Lab File ID: | N/A |
| Dilution: | 1.0 | Units: | mg/Kg | Initial Weight/Volume: | 1.0 mL |
| Date Analyzed: | 03/02/2010 1726 |  |  | Final Weight/Volume: | 1.0 mL |
| Date Prepared: | N/A |  |  |  |  |
| Date Leached: | 03/02/2010 1138 | Leachate Batch: | 680-162053 |  |  |

| Analyte | Sample Result/Qual |  | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|---|
| Sulfate-Soluble | 96 | U | 98 | NC | 30 | U |

## Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

### Method Blank - Batch: 660-90922

**Method: 9045C**
**Preparation: N/A**

Lab Sample ID: MB 660-90923/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/18/2010 2145
Date Prepared: N/A
Date Leached: 02/18/2010 1907

Analysis Batch: 660-90922
Prep Batch: N/A
Units: SU
Leachate Batch: 660-90923

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL

| Analyte | Result | Qual | PQL | PQL |
|---|---|---|---|---|
| pH-Soluble | 7.520 | | 1.00 | 1.00 |

### Lab Control Sample - Batch: 660-90922

**Method: 9045C**
**Preparation: N/A**

Lab Sample ID: LCS 660-90923/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/18/2010 2145
Date Prepared: N/A
Date Leached: 02/18/2010 1907

Analysis Batch: 660-90922
Prep Batch: N/A
Units: SU
Leachate Batch: 660-90923

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| pH-Soluble | 6.00 | 5.990 | 100 | 98 - 102 | |

### Duplicate - Batch: 660-90922

**Method: 9045C**
**Preparation: N/A**

Lab Sample ID: 660-33608-A-4-B DU
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/18/2010 2145
Date Prepared: N/A
Date Leached: 02/18/2010 1907

Analysis Batch: 660-90922
Prep Batch: N/A
Units: SU
Leachate Batch: 660-90923

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL

| Analyte | Sample Result/Qual | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|
| pH-Soluble | 7.76 | 7.750 | 0 | 20 | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

## Method Blank - Batch: 680-161519

**Method: 9060**
**Preparation: N/A**

Lab Sample ID: MB 680-161519/1
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/23/2010 1035
Date Prepared: N/A

Analysis Batch: 680-161519
Prep Batch: N/A
Units: mg/Kg

Instrument ID: TOC2
Lab File ID: N/A
Initial Weight/Volume: 100 mg
Final Weight/Volume: 1.0 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Total Organic Carbon | 1000 | U | 1000 | 3000 |

## Lab Control Sample - Batch: 680-161519

**Method: 9060**
**Preparation: N/A**

Lab Sample ID: LCS 680-161519/2
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/23/2010 1035
Date Prepared: N/A

Analysis Batch: 680-161519
Prep Batch: N/A
Units: mg/Kg

Instrument ID: TOC2
Lab File ID: N/A
Initial Weight/Volume: 20.5 mg
Final Weight/Volume: 1.0 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Total Organic Carbon | 408000 | 377000 | 92 | 60 - 140 | |

## Matrix Spike/
## Matrix Spike Duplicate Recovery Report - Batch: 680-161519

**Method: 9060**
**Preparation: N/A**

MS Lab Sample ID: 680-55167-A-8 MS
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/23/2010 1035
Date Prepared: N/A

Analysis Batch: 680-161519
Prep Batch: N/A

Instrument ID: TOC2
Lab File ID: N/A
Initial Weight/Volume: 113.5 mg
Final Weight/Volume: 113.5 mg

MSD Lab Sample ID: 680-55167-A-8 MSD
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/23/2010 1035
Date Prepared: N/A

Analysis Batch: 680-161519
Prep Batch: N/A

Instrument ID: TOC2
Lab File ID: N/A
Initial Weight/Volume: 113.1 mg
Final Weight/Volume: 113.1 mg

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Total Organic Carbon | 83 | 83 | 60 - 140 | 1 | 40 | | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Duplicate - Batch: 680-161519**

**Method: 9060**
**Preparation: N/A**

Lab Sample ID: 680-55167-A-2 DU
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/23/2010 1035
Date Prepared: N/A

Analysis Batch: 680-161519
Prep Batch: N/A
Units: mg/Kg

Instrument ID: TOC2
Lab File ID: N/A
Initial Weight/Volume: 97.0 mg
Final Weight/Volume: 1.0 mL

| Analyte | Sample Result/Qual | | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|---|
| Total Organic Carbon | 1500 | I | 1760 | 13 | 40 | I |

### Method Blank - Batch: 660-90996

**Method: SM 2320B**
**Preparation: N/A**

Lab Sample ID: MB 660-90996/3
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/23/2010 1010
Date Prepared: N/A

Analysis Batch: 660-90996
Prep Batch: N/A
Units: mg/L

Instrument ID: MANTECH
Lab File ID: N/A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Result | Qual | PQL | PQL |
|---|---|---|---|---|
| Alkalinity | 1.0 | U | 1.0 | 1.0 |

### Lab Control Sample - Batch: 660-90996

**Method: SM 2320B**
**Preparation: N/A**

Lab Sample ID: LCS 660-90996/4
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/23/2010 1017
Date Prepared: N/A

Analysis Batch: 660-90996
Prep Batch: N/A
Units: mg/L

Instrument ID: MANTECH
Lab File ID: N/A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Alkalinity | 118 | 119 | 101 | 80 - 120 | |

### Duplicate - Batch: 660-90996

**Method: SM 2320B**
**Preparation: N/A**

Lab Sample ID: 660-33863-5
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/23/2010 1031
Date Prepared: N/A

Analysis Batch: 660-90996
Prep Batch: N/A
Units: mg/L

Instrument ID: MANTECH
Lab File ID: N/A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Sample Result/Qual | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|
| Alkalinity | 270 | 272 | 1 | 30 | |

## Method Blank - Batch: 660-91137

**Method: SM 2520B**
**Preparation: N/A**

Lab Sample ID: MB 660-91137/1
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1400
Date Prepared: N/A

Analysis Batch: 660-91137
Prep Batch: N/A
Units: ppt

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 100 mL

| Analyte | Result | Qual | PQL | PQL |
|---|---|---|---|---|
| Salinity | 2.0 | U | 2.0 | 2.0 |

## Lab Control Sample/ Lab Control Sample Duplicate Recovery Report - Batch: 660-91137

**Method: SM 2520B**
**Preparation: N/A**

LCS Lab Sample ID: LCS 660-91137/2
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1400
Date Prepared: N/A

Analysis Batch: 660-91137
Prep Batch: N/A
Units: ppt

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 100 mL

LCSD Lab Sample ID: LCSD 660-91137/3
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1400
Date Prepared: N/A

Analysis Batch: 660-91137
Prep Batch: N/A
Units: ppt

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 100 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | LCS | LCSD | Limit | RPD | RPD Limit | LCS Qual | LCSD Qual |
| Salinity | 103 | 103 | 90 - 110 | 0 | 10 | | |

## Duplicate - Batch: 660-91137

**Method: SM 2520B**
**Preparation: N/A**

Lab Sample ID: 660-33863-5
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1400
Date Prepared: N/A

Analysis Batch: 660-91137
Prep Batch: N/A
Units: ppt

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 100 mL

| Analyte | Sample Result/Qual | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|
| Salinity | 2.5 | 2.50 | 0 | 10 | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Method Blank - Batch: 660-90872**

**Method: SM 2540D**
**Preparation: N/A**

Lab Sample ID: MB 660-90872/1
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 1455
Date Prepared: N/A

Analysis Batch: 660-90872
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 250 mL
Final Weight/Volume: 250 mL

| Analyte | Result | Qual | PQL | PQL |
|---|---|---|---|---|
| Total Suspended Solids | 1.0 | U | 1.0 | 1.0 |

**Lab Control Sample - Batch: 660-90872**

**Method: SM 2540D**
**Preparation: N/A**

Lab Sample ID: LCS 660-90872/2
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 1455
Date Prepared: N/A

Analysis Batch: 660-90872
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 250 mL
Final Weight/Volume: 250 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Total Suspended Solids | 100 | 106 | 106 | 80 - 120 | |

**Duplicate - Batch: 660-90872**

**Method: SM 2540D**
**Preparation: N/A**

Lab Sample ID: 660-33876-E-1 DU
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 1455
Date Prepared: N/A

Analysis Batch: 660-90872
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 250 mL
Final Weight/Volume: 250 mL

| Analyte | Sample Result/Qual | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|
| Total Suspended Solids | 1.6 | 1.60 | 0 | 20 | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Method Blank - Batch: 660-91248**

**Method: SM 426C**
**Preparation: N/A**

Lab Sample ID: MB 660-91248/12
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/01/2010 1350
Date Prepared: N/A

Analysis Batch: 660-91248
Prep Batch: N/A
Units: mg/L

Instrument ID: Turbidity
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Sulfate | 2.0 | U | 2.0 | 5.0 |

**Lab Control Sample - Batch: 660-91248**

**Method: SM 426C**
**Preparation: N/A**

Lab Sample ID: LCS 660-91248/13
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/01/2010 1350
Date Prepared: N/A

Analysis Batch: 660-91248
Prep Batch: N/A
Units: mg/L

Instrument ID: Turbidity
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Sulfate | 10.0 | 9.24 | 92 | 75 - 125 | |

**Matrix Spike/**
**Matrix Spike Duplicate Recovery Report - Batch: 660-91248**

**Method: SM 426C**
**Preparation: N/A**

MS Lab Sample ID: 660-33863-9
Client Matrix: Water
Dilution: 5.0
Date Analyzed: 03/01/2010 1350
Date Prepared: N/A

Analysis Batch: 660-91248
Prep Batch: N/A

Instrument ID: Turbidity
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

MSD Lab Sample ID: 660-33863-9
Client Matrix: Water
Dilution: 5.0
Date Analyzed: 03/01/2010 1350
Date Prepared: N/A

Analysis Batch: 660-91248
Prep Batch: N/A

Instrument ID: Turbidity
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Sulfate | 107 | 92 | 75 - 125 | 4 | 30 | | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

## Method Blank - Batch: 660-91159

**Method: SM 4500 Cl- E**
**Preparation: N/A**

Lab Sample ID: MB 660-91159/3
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1400
Date Prepared: N/A

Analysis Batch: 660-91159
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 2 mL
Final Weight/Volume: 2 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Chloride | 3.0 | U | 3.0 | 5.0 |

## Lab Control Sample - Batch: 660-91159

**Method: SM 4500 Cl- E**
**Preparation: N/A**

Lab Sample ID: LCS 660-91159/4
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1400
Date Prepared: N/A

Analysis Batch: 660-91159
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 2 mL
Final Weight/Volume: 2 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Chloride | 25.0 | 24.8 | 99 | 90 - 110 | |

## Matrix Spike/
## Matrix Spike Duplicate Recovery Report - Batch: 660-91159

**Method: SM 4500 Cl- E**
**Preparation: N/A**

MS Lab Sample ID: 660-33886-N-6 MS
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1400
Date Prepared: N/A

Analysis Batch: 660-91159
Prep Batch: N/A

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 2 mL
Final Weight/Volume: 2 mL

MSD Lab Sample ID: 660-33886-N-6 MSD
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1400
Date Prepared: N/A

Analysis Batch: 660-91159
Prep Batch: N/A

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 2 mL
Final Weight/Volume: 2 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Chloride | 95 | 100 | 90 - 110 | 1 | 30 | | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

## Method Blank - Batch: 660-91210

**Method: SM 4500 Cl- E**
**Preparation: N/A**

Lab Sample ID: MB 660-91210/3
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/27/2010 0946
Date Prepared: N/A

Analysis Batch: 660-91210
Prep Batch: N/A
Units: mg/L

Instrument ID: SEAL1
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 2 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Chloride | 3.0 | U | 3.0 | 5.0 |

## Lab Control Sample - Batch: 660-91210

**Method: SM 4500 Cl- E**
**Preparation: N/A**

Lab Sample ID: LCS 660-91210/4
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/27/2010 0946
Date Prepared: N/A

Analysis Batch: 660-91210
Prep Batch: N/A
Units: mg/L

Instrument ID: SEAL1
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 2 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Chloride | 25.0 | 25.0 | 100 | 90 - 110 | |

## Matrix Spike/ Matrix Spike Duplicate Recovery Report - Batch: 660-91210

**Method: SM 4500 Cl- E**
**Preparation: N/A**

MS Lab Sample ID: 660-33863-7
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/27/2010 0946
Date Prepared: N/A

Analysis Batch: 660-91210
Prep Batch: N/A

Instrument ID: SEAL1
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 2 mL

MSD Lab Sample ID: 660-33863-7
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/27/2010 0946
Date Prepared: N/A

Analysis Batch: 660-91210
Prep Batch: N/A

Instrument ID: SEAL1
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 2 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Chloride | 95 | 91 | 90 - 110 | 0 | 30 | | |

### Method Blank - Batch: 660-91342

**Method: SM 4500 P E**
**Preparation: N/A**

| | | | | | |
|---|---|---|---|---|---|
| Lab Sample ID: | MB 660-91341/1-A | Analysis Batch: | 660-91342 | Instrument ID: | No Equipment Assigned |
| Client Matrix: | Solid | Prep Batch: | N/A | Lab File ID: | N/A |
| Dilution: | 1.0 | Units: | mg/L | Initial Weight/Volume: | 1.0 mL |
| Date Analyzed: | 03/02/2010 1600 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | N/A | | | | |
| Date Leached: | 03/01/2010 1600 | Leachate Batch: | 660-91341 | | |

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Orthophosphate-Soluble | 0.75 | U | 0.75 | 3.0 |

### Lab Control Sample - Batch: 660-91342

**Method: SM 4500 P E**
**Preparation: N/A**

| | | | | | |
|---|---|---|---|---|---|
| Lab Sample ID: | LCS 660-91341/2-A | Analysis Batch: | 660-91342 | Instrument ID: | No Equipment Assigned |
| Client Matrix: | Solid | Prep Batch: | N/A | Lab File ID: | N/A |
| Dilution: | 1.0 | Units: | mg/L | Initial Weight/Volume: | 1.0 mL |
| Date Analyzed: | 03/02/2010 1600 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | N/A | | | | |
| Date Leached: | 03/01/2010 1600 | Leachate Batch: | 660-91341 | | |

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Orthophosphate-Soluble | 3.00 | 3.07 | 102 | 90 - 110 | |

### Matrix Spike/
### Matrix Spike Duplicate Recovery Report - Batch: 660-91342

**Method: SM 4500 P E**
**Preparation: N/A**

| | | | | | |
|---|---|---|---|---|---|
| MS Lab Sample ID: | 660-33863-1 | Analysis Batch: | 660-91342 | Instrument ID: | No Equipment Assigned |
| Client Matrix: | Solid | Prep Batch: | N/A | Lab File ID: | N/A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 1.0 mL |
| Date Analyzed: | 03/02/2010 1600 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | N/A | | | | |
| Date Leached: | 03/01/2010 1600 | Leachate Batch: | 660-91341 | | |

| | | | | | |
|---|---|---|---|---|---|
| MSD Lab Sample ID: | 660-33863-1 | Analysis Batch: | 660-91342 | Instrument ID: | No Equipment Assigned |
| Client Matrix: | Solid | Prep Batch: | N/A | Lab File ID: | N/A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 1.0 mL |
| Date Analyzed: | 03/02/2010 1600 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | N/A | | | | |
| Date Leached: | 03/01/2010 1600 | Leachate Batch: | 660-91341 | | |

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Orthophosphate-Soluble | 94 | 96 | 90 - 110 | 1 | 30 | | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Method Blank - Batch: 660-90918**

**Method: SM 4500 S2 F**
**Preparation: N/A**

Lab Sample ID: MB 660-90918/1
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 1600
Date Prepared: N/A

Analysis Batch: 660-90918
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 250 mL

| Analyte | Result | Qual | PQL | PQL |
|---|---|---|---|---|
| Sulfide | 1.0 | U | 1.0 | 1.0 |

**Lab Control Sample/**
**Lab Control Sample Duplicate Recovery Report - Batch: 660-90918**

**Method: SM 4500 S2 F**
**Preparation: N/A**

LCS Lab Sample ID: LCS 660-90918/2
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 1600
Date Prepared: N/A

Analysis Batch: 660-90918
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 250 mL

LCSD Lab Sample ID: LCSD 660-90918/3
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 1600
Date Prepared: N/A

Analysis Batch: 660-90918
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 250 mL

|  | % Rec. |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|
| Analyte | LCS | LCSD | Limit | RPD | RPD Limit | LCS Qual | LCSD Qual |
| Sulfide | 88 | 90 | 75 - 125 | 2 | 25 |  |  |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

## Method Blank - Batch: 660-91131

**Method: SM 5220D**
**Preparation: SM 5220**

Lab Sample ID: MB 660-91131/3-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1557
Date Prepared: 02/25/2010 1333

Analysis Batch: 660-91132
Prep Batch: 660-91131
Units: mg/L

Instrument ID: HACH
Lab File ID: N/A
Initial Weight/Volume: 2 mL
Final Weight/Volume: 2 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Chemical Oxygen Demand | 10 | U | 10 | 20 |

## Lab Control Sample - Batch: 660-91131

**Method: SM 5220D**
**Preparation: SM 5220**

Lab Sample ID: LCS 660-91131/4-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1557
Date Prepared: 02/25/2010 1333

Analysis Batch: 660-91132
Prep Batch: 660-91131
Units: mg/L

Instrument ID: HACH
Lab File ID: N/A
Initial Weight/Volume: 2 mL
Final Weight/Volume: 2 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Chemical Oxygen Demand | 50.0 | 45.3 | 91 | 90 - 110 | |

## Matrix Spike/ Matrix Spike Duplicate Recovery Report - Batch: 660-91131

**Method: SM 5220D**
**Preparation: SM 5220**

MS Lab Sample ID: 660-33863-7
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1557
Date Prepared: 02/25/2010 1333

Analysis Batch: 660-91132
Prep Batch: 660-91131

Instrument ID: HACH
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

MSD Lab Sample ID: 660-33863-7
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1557
Date Prepared: 02/25/2010 1333

Analysis Batch: 660-91132
Prep Batch: 660-91131

Instrument ID: HACH
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Chemical Oxygen Demand | 92 | 111 | 90 - 110 | 19 | 20 | | J3 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

## Method Blank - Batch: 680-161223

**Method: SM 5550B**
**Preparation: N/A**

Lab Sample ID: MB 680-161223/1
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 1126
Date Prepared: N/A

Analysis Batch: 680-161223
Prep Batch: N/A
Units: mg/L

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 2 mL
Final Weight/Volume: 2 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Tannins and Lignins | 0.037 | U | 0.037 | 0.10 |

## Lab Control Sample - Batch: 680-161223

**Method: SM 5550B**
**Preparation: N/A**

Lab Sample ID: LCS 680-161223/2
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 1126
Date Prepared: N/A

Analysis Batch: 680-161223
Prep Batch: N/A
Units: mg/L

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 2 mL
Final Weight/Volume: 2 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Tannins and Lignins | 1.00 | 0.937 | 94 | 80 - 120 | |

## Matrix Spike/ Matrix Spike Duplicate Recovery Report - Batch: 680-161223

**Method: SM 5550B**
**Preparation: N/A**

MS Lab Sample ID: 400-45490-A-1 MS
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 1126
Date Prepared: N/A

Analysis Batch: 680-161223
Prep Batch: N/A

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10 mL

MSD Lab Sample ID: 400-45490-A-1 MSD
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 1126
Date Prepared: N/A

Analysis Batch: 680-161223
Prep Batch: N/A

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Tannins and Lignins | 73 | 69 | 80 - 120 | 1 | 20 | J3 | J3 |

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
2960 Foster Creighton Road Nashville, TN 37204 * 800-765-0980 * Fax 615-726-3404

2/25/2010 11:36:32AM

Client: TestAmerica Tampa
6712 Benjamin Road, Suite 100
Tampa, FL 33634

Attn: Nancy Robertson

Work Order: NTB1374
Project Name: GHNS Barbados
Project Number: 660-33863-1
Date Received: 02/17/10

| SAMPLE IDENTIFICATION | LAB NUMBER | COLLECTION DATE AND TIME |
|---|---|---|
| 11A | NTB1374-01 | 02/15/10 10:10 |
| 8A | NTB1374-02 | 02/15/10 13:30 |
| 13 | NTB1374-03 | 02/15/10 11:00 |
| 14 | NTB1374-04 | 02/15/10 11:40 |
| 12A | NTB1374-05 | 02/15/10 13:50 |
| 9A | NTB1374-06 | 02/15/10 12:50 |
| 6B | NTB1374-07 | 02/15/10 14:50 |

Samples were received into laboratory at a temperature of 2.50 °C.

Comments:

An executed copy of the chain of custody, the project quality control data, and the sample receipt form are also included as an addendum to this report. If you have any questions relating to this analytical report, please contact your Laboratory Project Manager. Any opinions, if expressed, are outside the scope of the Laboratory's accreditation.

Results are reported on a wet weight basis unless otherwise noted

The reported results were obtained in compliance with 2003 NELAC standards unless otherwise noted.

These results relate only to the items tested

Estimated uncertainty is available upon request.

Florida Certification Number: E87358

This report has been electronically signed.

Approved By:

Judith A Beato

**TestAmerica Nashville**
Judith A Beato
Project Manager

Client: TestAmerica Tampa
6712 Benjamin Road, Suite 100
Tampa, FL 33634
Attn: Nancy Robertson

Work Order: NTB1374
Project: GHNS Barbados
Project Number: 660-33863-1

Sampled: 02/15/10
Received: 02/17/10

## LABORATORY REPORT
### Sample ID: 11A - Lab Number: NTB1374-01 - Matrix: Water

| CAS # | Analyte | Result | Q | Units | MDL | PQL | Dil Factor | Analyzed Date/Time | By | Method | Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | | | | | |
| BOD | BOD - 5 Day | 2.00 | Q,U | mg/L | 2.00 | 2.00 | 1 | 02/23/10 08:30 | MXN | SM 5210B | 10B3730 |
| | | | | | | | | Prep Date: 02/18/10 12:05 | | | |
| NA | **Chlorophyll-a Uncorrected** | **21.7** | Q | ug/L | 2.00 | 2.00 | 1 | 02/23/10 12:21 | MXN | SM 10200H | 10B3860 |
| | | | | | | | | Filtered Date: 2-17-10 15:52 | | | |

## LABORATORY REPORT
### Sample ID: 8A - Lab Number: NTB1374-02 - Matrix: Water

| CAS # | Analyte | Result | Q | Units | MDL | PQL | Dil Factor | Analyzed Date/Time | By | Method | Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | | | | | |
| BOD | BOD - 5 Day | 2.00 | Q,U | mg/L | 2.00 | 2.00 | 1 | 02/23/10 08:30 | MXN | SM 5210B | 10B3730 |
| | | | | | | | | Prep Date: 02/18/10 12:05 | | | |
| NA | **Chlorophyll-a Uncorrected** | **18.3** | Q | ug/L | 2.00 | 2.00 | 1 | 02/23/10 12:23 | MXN | SM 10200H | 10B3860 |
| | | | | | | | | Filtered Date: 2-17-10 15:53 | | | |

## LABORATORY REPORT
### Sample ID: 13 - Lab Number: NTB1374-03 - Matrix: Water

| CAS # | Analyte | Result | Q | Units | MDL | PQL | Dil Factor | Analyzed Date/Time | By | Method | Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | | | | | |
| BOD | **BOD - 5 Day** | **2.16** | Q | mg/L | 2.00 | 2.00 | 1 | 02/23/10 08:30 | MXN | SM 5210B | 10B3730 |
| | | | | | | | | Prep Date: 02/18/10 12:05 | | | |
| NA | **Chlorophyll-a Uncorrected** | **14.9** | Q | ug/L | 2.00 | 2.00 | 1 | 02/23/10 12:24 | MXN | SM 10200H | 10B3860 |
| | | | | | | | | Filtered Date: 2-17-10 15:58 | | | |

## LABORATORY REPORT
### Sample ID: 14 - Lab Number: NTB1374-04 - Matrix: Water

| CAS # | Analyte | Result | Q | Units | MDL | PQL | Dil Factor | Analyzed Date/Time | By | Method | Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | | | | | |
| BOD | **BOD - 5 Day** | **2.73** | Q | mg/L | 2.00 | 2.00 | 1 | 02/23/10 08:30 | MXN | SM 5210B | 10B3730 |
| | | | | | | | | Prep Date: 02/18/10 12:05 | | | |
| NA | **Chlorophyll-a Uncorrected** | **64.2** | Q | ug/L | 2.00 | 2.00 | 1 | 02/23/10 12:25 | MXN | SM 10200H | 10B3860 |
| | | | | | | | | Filtered Date: 2-17-10 16:05 | | | |

## LABORATORY REPORT
### Sample ID: 12A - Lab Number: NTB1374-05 - Matrix: Water

| CAS # | Analyte | Result | Q | Units | MDL | PQL | Dil Factor | Analyzed Date/Time | By | Method | Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | | | | | |
| BOD | BOD - 5 Day | 2.00 | Q,U | mg/L | 2.00 | 2.00 | 1 | 02/23/10 08:30 | MXN | SM 5210B | 10B3730 |
| | | | | | | | | Prep Date: 02/18/10 12:05 | | | |

**TestAmerica Nashville**
Judith A Beato
Project Manager

Client: TestAmerica Tampa
6712 Benjamin Road, Suite 100
Tampa, FL 33634
Attn: Nancy Robertson

Work Order: NTB1374
Project: GHNS Barbados
Project Number: 660-33863-1

Sampled: 02/15/10
Received: 02/17/10

## LABORATORY REPORT
### Sample ID: 12A - Lab Number: NTB1374-05 - Matrix: Water

| CAS # | Analyte | Result | Q | Units | MDL | PQL | Dil Factor | Analyzed Date/Time | By | Method | Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters - Cont.** | | | | | | | | | | | |
| NA | **Chlorophyll-a Uncorrected** | **10.3** | Q | ug/L | 2.00 | 2.00 | 1 | 02/23/10 12:27 | MXN | SM 10200H | 10B3860 |
| | | | | | | | | Filtered Date: 2-17-10 16:06 | | | |

## LABORATORY REPORT
### Sample ID: 9A - Lab Number: NTB1374-06 - Matrix: Water

| CAS # | Analyte | Result | Q | Units | MDL | PQL | Dil Factor | Analyzed Date/Time | By | Method | Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | | | | | |
| BOD | BOD - 5 Day | 2.00 | Q,U | mg/L | 2.00 | 2.00 | 1 | 02/23/10 08:30 | MXN | SM 5210B | 10B3730 |
| | | | | | | | | Prep Date: 02/18/10 12:05 | | | |
| NA | **Chlorophyll-a Uncorrected** | **29.6** | Q | ug/L | 2.00 | 2.00 | 1 | 02/23/10 12:28 | MXN | SM 10200H | 10B3860 |
| | | | | | | | | Filtered Date: 2-17-10 16:07 | | | |

## LABORATORY REPORT
### Sample ID: 6B - Lab Number: NTB1374-07 - Matrix: Water

| CAS # | Analyte | Result | Q | Units | MDL | PQL | Dil Factor | Analyzed Date/Time | By | Method | Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | | | | | |
| BOD | **BOD - 5 Day** | **8.72** | Q | mg/L | 2.00 | 2.00 | 1 | 02/23/10 08:30 | MXN | SM 5210B | 10B3730 |
| | | | | | | | | Prep Date: 02/18/10 12:05 | | | |
| NA | **Chlorophyll-a Uncorrected** | **30.9** | Q | ug/L | 2.00 | 2.00 | 1 | 02/23/10 12:30 | MXN | SM 10200H | 10B3860 |
| | | | | | | | | Filtered Date: 2-17-10 16:08 | | | |

Client: TestAmerica Tampa
6712 Benjamin Road, Suite 100
Tampa, FL 33634
Attn: Nancy Robertson

Work Order: NTB1374
Project: GHNS Barbados
Project Number: 660-33863-1

Sampled: 02/15/10
Received: 02/17/10

## SAMPLE EXTRACTION DATA

| Parameter | Lab Number | Wt/Vol Extracted | Extracted Vol | Date | Analyst | Method |
|---|---|---|---|---|---|---|
| General Chemistry Parameters | NTB1374-01 | 300.0 mL | 300.0 mL | 02/18/2010 | MXN | *** DEFAULT PREF |
| General Chemistry Parameters | NTB1374-02 | 300.0 mL | 300.0 mL | 02/18/2010 | MXN | *** DEFAULT PREF |
| General Chemistry Parameters | NTB1374-03 | 300.0 mL | 300.0 mL | 02/18/2010 | MXN | *** DEFAULT PREF |
| General Chemistry Parameters | NTB1374-04 | 300.0 mL | 300.0 mL | 02/18/2010 | MXN | *** DEFAULT PREF |
| General Chemistry Parameters | NTB1374-05 | 300.0 mL | 300.0 mL | 02/18/2010 | MXN | *** DEFAULT PREF |
| General Chemistry Parameters | NTB1374-06 | 300.0 mL | 300.0 mL | 02/18/2010 | MXN | *** DEFAULT PREF |
| General Chemistry Parameters | NTB1374-07 | 300.0 mL | 300.0 mL | 02/18/2010 | MXN | *** DEFAULT PREF |
| General Chemistry Parameters | NTB1374-01 | 1.0 filter | 1.0 filter | 02/17/2010 | MXN | Filtering |
| General Chemistry Parameters | NTB1374-02 | 1.0 filter | 1.0 filter | 02/17/2010 | MXN | Filtering |
| General Chemistry Parameters | NTB1374-03 | 1.0 filter | 1.0 filter | 02/17/2010 | MXN | Filtering |
| General Chemistry Parameters | NTB1374-04 | 1.0 filter | 1.0 filter | 02/17/2010 | MXN | Filtering |
| General Chemistry Parameters | NTB1374-05 | 1.0 filter | 1.0 filter | 02/17/2010 | MXN | Filtering |
| General Chemistry Parameters | NTB1374-06 | 1.0 filter | 1.0 filter | 02/17/2010 | MXN | Filtering |
| General Chemistry Parameters | NTB1374-07 | 1.0 filter | 1.0 filter | 02/17/2010 | MXN | Filtering |

Client: TestAmerica Tampa
6712 Benjamin Road, Suite 100
Tampa, FL 33634
Attn: Nancy Robertson

Work Order: NTB1374
Project: GHNS Barbados
Project Number: 660-33863-1

Sampled: 02/15/10
Received: 02/17/10

## PROJECT QUALITY CONTROL DATA
### Blank

| Analyte | Blank Value | Q | Units | Q.C. Batch | Lab Number |
|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | |
| BOD - 5 Day | 2.00 | | mg/L | 10B3730 | 10B3730-BLK1 |
| Chlorophyll-a Uncorrected | 2.00 | U | ug/L | 10B3860 | 10B3860-BLK1 |

## PROJECT QUALITY CONTROL DATA
### Duplicate

| Analyte | Orig. Val. | Duplicate | Q | Units | RPD | RPD Limit | Q.C. Batch | Sample Duplicated |
|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | | |
| BOD - 5 Day | <2.00 | 2.00 | | mg/L | | 20 | 10B3730 | NTB1374-01 |
| Chlorophyll-a Uncorrected | 21.7 | 21.7 | | ug/L | 0 | 50 | 10B3860 | NTB1374-01 |

## PROJECT QUALITY CONTROL DATA
### LCS

| Analyte | Known Val. | Analyzed Val | Q | Units | % Rec. | Target Range | Q.C. Batch |
|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | |
| BOD - 5 Day | 198 | 193 | | mg/L | 97 | 85 - 115 | 10B3730 |
| Chlorophyll-a Uncorrected | 200 | 168 | | ug/L | 84 | 80 - 120 | 10B3860 |

## PROJECT QUALITY CONTROL DATA
### LCS Dup

| Analyte | Orig. Val. | Duplicate | Q | Units | Spike Conc | % Rec. | RPD | RPD Limit | Q.C. Batch | Sample Duplicated |
|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | | | | |
| Chlorophyll-a Uncorrected | | 167 | | ug/L | 200 | 83 | 0.8 | 50 | 10B3860 | |

**TestAmerica Nashville**
Judith A Beato
Project Manager

| | | | | | |
|---|---|---|---|---|---|
| Client: | TestAmerica Tampa<br>6712 Benjamin Road, Suite 100<br>Tampa, FL 33634 | Work Order: | NTB1374 | Sampled: | 02/15/10 |
| | | Project: | GHNS Barbados | Received: | 02/17/10 |
| | | Project Number: | 660-33863-1 | | |
| Attn: | Nancy Robertson | | | | |

## CERTIFICATION SUMMARY

**TestAmerica Nashville**

| Method | Matrix | A2LA | AIHA | Nelac | Florida |
|---|---|---|---|---|---|
| SM 10200H | Water | | | X | X |
| SM 5210B | Water | | N/A | X | X |

**Subcontracted Laboratories**

TestAmerica - Orlando, FL Florida Cert #E83012
8010 Sunport Drive Suite 116 - Orlando, FL 32809

Analysis Performed: BOD 5 Day SM 5210B
Samples: NTB1374-01, NTB1374-02, NTB1374-03, NTB1374-04, NTB1374-05, NTB1374-06, NTB1374-07

Analysis Performed: Chlorophyll-a Uncorrected SM10200H
Samples: NTB1374-01, NTB1374-02, NTB1374-03, NTB1374-04, NTB1374-05, NTB1374-06, NTB1374-07

## DATA QUALIFIERS AND DEFINITIONS

| | |
|---|---|
| **Q** | Sample analyzed beyond acceptable holding time. |
| **U** | The compound was analyzed for but not detected |

## ADDITIONAL COMMENTS

When insufficient sample volume is received for Matrix Spike and Matrix Spike Duplicate, Laboratory Control Spike and Laboratory Control Spike Duplicate data is used for batch QC.

**TestAmerica Nashville**
Judith A Beato
Project Manager

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

4310 East Anderson Road * Orlando, FL 32812 * 407-851-2560 * Fax 407-856-0886 * 800-851-

Client: TestAmerica Tampa

Project: NTB1374

Shipped By: Walk-in

Tracking Number:

Cooler Received On: 02/17/10 15:13

And Opened On (Date/time): 2-17-10/1513

Received By: Ryan Reich

Logged in by: Ryan Reich

Were custody seals on the outside of cooler? **YES** ____ **NO** ✓ If Yes # ____ Location ____

Were custody seals intact? **YES** ____ **NO** ____ **N/A** ✓ (no seals present)

Chain of Custody Complete? **YES** ✓ **NO** ____

Discrepancy Comments:

Cooler Temparture When Opened: 2.50 Degrees Celsius

Temparture Blank Included: **YES** ____ **NO** ✓

Packing Material: Bubblewrap ____ NONE ____ [✓ Other:] Plastic

Received on Ice: **YES** ✓ **NO** ____ Other: ____ Total # Of Containers: 14 # Vials ____

Any Bottles Broken? **YES** ____ **NO** ✓ If Yes Which One(s)? ____

Any Missing Samples? **YES** ____ **NO** ✓ If Yes Which One(s)? ____

pH Levels: H2SO4 <=2? ____ HNO3 <=2? ____ HCL <=2? ____ NaOH >=10? ____

# Of Containers Unpreserved between 6 and 8? 14

Any Air Bubbles in VOA Vials? **YES** ____ **NO** ____ **N/A** ✓ (no VOA vials received)

Was there enough sample shipped in each container? **YES** ✓ **NO** ~~✓~~ RR 2-17-10

Correct Preservatives Used? **YES** ✓ **NO** ____ If No, see comments:

Project Manager: Judith A Beato

Corrective Actions Taken

**TestAmerica Tampa**
6712 Benjamin Road Suite 100
Tampa, FL 33634
Phone (813) 885-7427 Fax (813) 885-7049

# Chain of Custody Record

MTB1374

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

| | | | | |
|---|---|---|---|---|
| **Client Information (Sub Contract Lab)** | Sampler: | Lab PM:<br>Robertson, Nancy | Carrier Tracking No(s): | COC No:<br>660-19157.1 |
| Client Contact:<br>Shipping/Receiving | Phone: | E-Mail:<br>nancy.robertson@testamericainc.com | | Page:<br>Page 1 of 1 |
| Company:<br>TestAmerica Laboratories, Inc | | **Analysis Requested** | | Job #:<br>660-33863-1 |
| Address:<br>8010 Sunport Drive, Suite 116, | **Due Date Requested:**<br>2/24/2010 | | | **Preservation Codes:** |
| City:<br>Orlando | **TAT Requested (days):** | | | |
| State, Zip:<br>FL, 32809 | | | | |
| Phone: | PO #: | | | |
| Email: | WO #: | | | |
| Project Name:<br>GHNS Barbados | Project #:<br>66002941 | | | |
| Site: | SSOW#: | | | Other: |

Preservation Codes:
- A - HCL
- B - NaOH
- C - Zn Acetate
- D - Nitric Acid
- E - NaHSO4
- F - MeOH
- G - Amchlor
- H - Ascorbic Acid
- I - Ice
- J - DI Water
- K - EDTA
- L - EDA
- M - Hexane
- N - None
- O - AsNaO2
- P - Na2O4S
- Q - Na2SO3
- R - Na2S2SO3
- S - H2SO4
- T - TSP Dodecahydrate
- U - Acetone
- V - MCAA
- W - ph 4-5
- Z - other (specify)

| Sample Identification - Client ID (Lab ID) | Sample Date | Sample Time | Sample Type (C=comp, G=grab) | Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air) | Field Filtered Sample (Yes or No) | Perform MS/MSD (Yes or No) | 10200H/ Chlorophyll-a | BOD | Total Number of containers | Special Instructions/Note: |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Preservation Code | | | | | | | |
| 11A (660-33863-5) | 2/15/10 | 10:10 | | Water | | | X | X | 2 | 01 |
| 8A (660-33863-6) | 2/15/10 | 13:30 | | Water | | | X | X | 2 | 02 |
| 13 (660-33863-7) | 2/15/10 | 11:00 | | Water | | | X | X | 2 | 03 |
| 14 (660-33863-8) | 2/15/10 | 11:40 | | Water | | | X | X | 2 | 04 |
| 12A (660-33863-9) | 2/15/10 | 13:50 | | Water | | | X | X | 2 | 05 |
| 9A (660-33863-10) | 2/15/10 | 12:50 | | Water | | | X | X | 2 | 06 |
| 6B (660-33863-11) | 2/15/10 | 14:50 | | Water | | | X | X | 2 | 07 |

***Possible Hazard Identification***
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* ☐ *Poison B* ☐ *Unknown* ☐ *Radiological*

***Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)***
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ______ *Months*

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

| | | | | | |
|---|---|---|---|---|---|
| Empty Kit Relinquished by: | Date: | | Time: | | Method of Shipment: |
| Relinquished by: | Date/Time:<br>2-17-10 1145 | Company<br>TA-TP | Received by: | Date/Time:<br>2-17-10 1513 | Company<br>TA-ORL |
| Relinquished by: | Date/Time: | Company | Received by: | Date/Time: | Company |
| Relinquished by: | Date/Time: | Company | Received by: | Date/Time: | Company |

Custody Seals Intact:
Δ Yes Δ No

Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks: 2.5

Serial Number

**ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD**

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

660-33863

☒ **TestAmerica Tampa**
6712 Benjamin Road, Suite 100
Tampa, FL 33634

Website: www.testamericainc.com
Phone: (813) 885-7427
Fax: (813) 885-7049

○ Alternate Laboratory Name/Location
Phone:
Fax:

| | | |
|---|---|---|
| PROJECT REFERENCE GHNS | PROJECT NO. 2010001 | PROJECT LOCATION (STATE) Barbados |
| SAMPLER'S SIGNATURE | P.O. NUMBER | CONTRACT NO. |
| CLIENT (SITE) PM R. Pryor | CLIENT PHONE 813-237-3781 | CLIENT FAX |
| CLIENT NAME EEC | CLIENT E-MAIL barbados@eec-tampabay.com | |
| CLIENT ADDRESS Tampa FL | | |
| COMPANY CONTRACTING THIS WORK (if applicable) | | |

PAGE 1 OF 1

STANDARD REPORT DELIVERY ☒
DATE DUE ______
EXPEDITED REPORT DELIVERY (SURCHARGE) ○
DATE DUE ______
NUMBER OF COOLERS SUBMITTED PER SHIPMENT: 2

PRESERVATIVE

| SAMPLE DATE | SAMPLE TIME | SAMPLE IDENTIFICATION | COMPOSITE (C) OR GRAB (G) INDICATE | AQUEOUS (WATER) | SOLID OR SEMISOLID | AIR | NONAQUEOUS LIQUID (OIL, SOLVENT....) | Organochlorine Pest | ICP Metals Mercury | Nitrate, Nitrite, Sulphate, Orthophosphate | Sulfide, Phosphorus Ammonia | TOC | Herbicides | Organophosphorus Pest | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2/15/10 | 10:20 | 11 A | | | X | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | |
| 2/15/10 | 11:00 | 13 | | | X | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | |
| 2/15/10 | 1:40 | 8A | | | X | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | |
| 2/15/10 | 2:00 | 6B | | | X | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | |

NUMBER OF CONTAINERS SUBMITTED

| RELINQUISHED BY: (SIGNATURE) | DATE | TIME | RELINQUISHED BY: (SIGNATURE) | DATE | TIME | RELINQUISHED BY: (SIGNATURE) | DATE | TIME |
|---|---|---|---|---|---|---|---|---|
| EMPTY CONTAINERS | | | | 2/16/10 | 10:30 | Barbara Pryor | 2/15/10 | 3:45 |
| **RECEIVED BY: (SIGNATURE)** | **DATE** | **TIME** | **RECEIVED BY: (SIGNATURE)** | **DATE** | **TIME** | **RECEIVED BY: (SIGNATURE)** | **DATE** | **TIME** |
| EMPTY CONTAINERS | 2/10/10 | 2:00PM | Barbara Pryor | 2/15/10 | 10:30 | | | |

LABORATORY USE ONLY

| RECEIVED FOR LABORATORY BY: (SIGNATURE) | DATE | TIME | CUSTODY INTACT | CUSTODY SEAL NO. | TAMPA LOG NO. | COOLER TEMP. UPON RECEIPT | LABORATORY REMARKS |
|---|---|---|---|---|---|---|---|
| | 2/17/10 | 9:00 | YES ○<br>NO ○ | | | 3.0°C, 2.6°C C4-07 | Fedex |

TAL8240-660 (0209)

Serial Number

## ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

**TestAmerica**
THE LEADER IN ENVIRONMENTAL TESTING

☒ **TestAmerica Tampa**
6712 Benjamin Road, Suite 100
Tampa, FL 33634

Website: www.testamericainc.com
Phone: (813) 885-7427
Fax: (813) 885-7049

○ Alternate Laboratory Name/Location
Phone:
Fax:

PROJECT REFERENCE GHNS
PROJECT NO. 2010001
PROJECT LOCATION (STATE) Barbados
SAMPLER'S SIGNATURE
P.O. NUMBER
CONTRACT NO.
CLIENT (SITE) PM EEC - R. Pryor
CLIENT PHONE 813-237-3781
CLIENT FAX
CLIENT NAME EEC
CLIENT E-MAIL barbados@eec-tampabay.com
CLIENT ADDRESS Tampa FL
COMPANY CONTRACTING THIS WORK (if applicable)

PAGE 2 OF 2
STANDARD REPORT DELIVERY ☒
DATE DUE
EXPEDITED REPORT DELIVERY (SURCHARGE) ○
DATE DUE
NUMBER OF COOLERS SUBMITTED PER SHIPMENT: 1
REMARKS

| SAMPLE DATE | SAMPLE TIME | SAMPLE IDENTIFICATION | COMPOSITE (C) OR GRAB (G) INDICATE | AQUEOUS (WATER) | SOLID OR SEMISOLID | AIR | NONAQUEOUS LIQUID (OIL, SOLVENT....) | CO2 | COD | Sulfide | TSS, Turbidity | BOD | Herbicides | Organophosphorus Pest | Phosphorus Total | MG, NA, CU, FE, PB, K; Mercury | Organochlorine Pest | Tannins, Ligins | Chlorophyl A | Nitrate, Nitrite; Sulfate, Alkalinity; Chloride |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | PRESERVATIVE | | | | * | | | | | | | | | * |
| | | | | | | | NUMBER OF CONTAINERS SUBMITTED | | | | | | | | | | | | | |
| 2/15/10 | 10:10 | 11A | | X | | | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2/15/10 | 1:30 | 8A | | X | | | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2/15/10 | 11:00 | 13 | | X | | | | 2 | 1 | 1 | B | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2/15/10 | 11:40 | 14 | | X | | | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2/15/10 | 1:50 | 12A | | X | | | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2/15/10 | 12:50 | 9A | | X | | | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2/15/10 | 2:50 | 6B | | X | | | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

B = Broken
* Add Turbidity
* Salinity done in field - Donot do Salinity in Lab!!

| RELINQUISHED BY: (SIGNATURE) | DATE | TIME | RELINQUISHED BY: (SIGNATURE) | DATE | TIME | RELINQUISHED BY: (SIGNATURE) | DATE | TIME |
|---|---|---|---|---|---|---|---|---|
| EMPTY CONTAINERS | | | | 2/15/10 | 10:30 | Barbara Pryor | 2/15/10 | 3:45 |
| **RECEIVED BY: (SIGNATURE)** | **DATE** | **TIME** | **RECEIVED BY: (SIGNATURE)** | **DATE** | **TIME** | **RECEIVED BY: (SIGNATURE)** | **DATE** | **TIME** |
| EMPTY CONTAINERS | 2/10/10 | 2:00pm | Barbara Pryor | 2/15/10 | 10:30 | | | |

LABORATORY USE ONLY

| RECEIVED FOR LABORATORY BY: (SIGNATURE) | DATE | TIME | CUSTODY INTACT | CUSTODY SEAL NO. | TAMPA LOG NO. | COOLER TEMP. UPON RECEIPT | LABORATORY REMARKS |
|---|---|---|---|---|---|---|---|
| Bunny McCarty | 2/17/10 | 9:00 am | YES ○<br>NO ○ | | | 3.0°C, 2.0°C, 2.0°C, 2.4°C, 2.0°C, 2.0°C, 2.0°C | <ai-07 |

Fedex

TAL8240-660 (0209)

TestAmerica
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TestAmerica
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# PRESERVATION CONFIRMATION FORM

Tampa, FL

JOB NUMBER 660 - 33863 Logged in TALS By : Carol McNulty

Cooler Received on (date) 2-17-10 And Opened By (full name): James Ballard

1. Shipper (circle one) [✓ FEDEX] UPS DHL WALK-IN COURIER OTHER:

2. Tracking #

3. Temperature of rep. sample or temp blank when opened: Degrees Celsius

4. Number of H2SO4 (sulfuric acid) preserved containers: 14

   All containers pH < 2 ? yes If not please comment below:

5. Number of HCL (hydrochloric acid) preserved containers:

   All containers pH < 2 ? If not please comment below:

6. Number of HNO3 (nitric acid) preserved containers: 7

   All containers pH < 2 ? NO If not please comment below:

   12A Ph=7

7. Number of NaOH (sodium hydroxide) preserved containers: 7

   All containers pH >12 ? NO If not please comment below:

   Ph=10 6B, 14, 13, 8A, / Ph=11 11A, 9A, 12A

8. Number of Unpreserved containers: 55

   All containers pH between 6 and 8? yes If not please comment below:

9. Was chlorine present in any of the unpreserved containers? NO

   If yes, which samples?

pH Strip Lot#: Chlorine Strip Lot#:

FWI-CU-002:02.04.10:2

Revision 2- 02/04/10

# Login Sample Receipt Check List

Client: Environmental Engineering Consultant | Job Number: 660-33863-1

**Login Number: 33863** | **List Source: TestAmerica Tampa**
**Creator: McCaughey, Becky**
**List Number: 1**

| Question | T / F/ NA | Comment |
|---|---|---|
| Radioactivity either was not measured or, if measured, is at or below background | N/A | |
| The cooler's custody seal, if present, is intact. | True | |
| The cooler or samples do not appear to have been compromised or tampered with. | True | |
| Samples were received on ice. | True | 3.0,2.6,3.0,2.0,2.0,2.4,2.0,2.0,2.0 degrees C Cu-07 |
| Cooler Temperature is acceptable. | True | |
| Cooler Temperature is recorded. | True | |
| COC is present. | True | |
| COC is filled out in ink and legible. | True | |
| COC is filled out with all pertinent information. | True | |
| There are no discrepancies between the sample IDs on the containers and the COC. | True | |
| Samples are received within Holding Time. | True | minimal hold on nitrate,bod,chl A, turb,-will analyze asap |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | recd 8151 broken for ID#13-will use another bottle |
| Sample collection date/times are provided. | True | |
| Appropriate sample containers are used. | True | |
| Sample bottles are completely filled. | True | |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs | True | |
| VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter. | True | |
| If necessary, staff have been informed of any short hold time or quick TAT needs | True | |
| Multiphasic samples are not present. | True | |
| Samples do not require splitting or compositing. | True | |
| Is the Field Sampler's name present on COC? | True | |
| Sample Preservation Verified | True | |

# Login Sample Receipt Check List

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Login Number: 33863**
**Creator: Chea, Vanda**
**List Number: 1**

**List Source: TestAmerica Pensacola**
**List Creation: 02/18/10 03:36 PM**

| Question | T / F/ NA | Comment |
|---|---|---|
| Radioactivity either was not measured or, if measured, is at or below background | N/A | |
| The cooler's custody seal, if present, is intact. | True | |
| The cooler or samples do not appear to have been compromised or tampered with. | True | |
| Samples were received on ice. | True | |
| Cooler Temperature is acceptable. | True | 0.5°C |
| Cooler Temperature is recorded. | True | |
| COC is present. | True | |
| COC is filled out in ink and legible. | True | |
| COC is filled out with all pertinent information. | True | |
| There are no discrepancies between the sample IDs on the containers and the COC. | True | |
| Samples are received within Holding Time. | True | |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | |
| Sample collection date/times are provided. | True | |
| Appropriate sample containers are used. | True | |
| Sample bottles are completely filled. | True | |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs | True | |
| VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter. | True | |
| If necessary, staff have been informed of any short hold time or quick TAT needs | True | |
| Multiphasic samples are not present. | True | |
| Samples do not require splitting or compositing. | True | |
| Is the Field Sampler's name present on COC? | True | |
| Sample Preservation Verified | True | |

# Login Sample Receipt Check List

Client: Environmental Engineering Consultant

Job Number: 660-33863-1

**Login Number: 33863**
**Creator: Conner, Keaton**
**List Number: 1**

**List Source: TestAmerica Savannah**
**List Creation: 02/18/10 09:12 AM**

| Question | T / F/ NA | Comment |
|---|---|---|
| Radioactivity either was not measured or, if measured, is at or below background | N/A | |
| The cooler's custody seal, if present, is intact. | True | |
| The cooler or samples do not appear to have been compromised or tampered with. | True | |
| Samples were received on ice. | True | |
| Cooler Temperature is acceptable. | True | |
| Cooler Temperature is recorded. | True | |
| COC is present. | True | |
| COC is filled out in ink and legible. | True | |
| COC is filled out with all pertinent information. | True | |
| There are no discrepancies between the sample IDs on the containers and the COC. | True | |
| Samples are received within Holding Time. | True | |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | |
| Sample collection date/times are provided. | True | |
| Appropriate sample containers are used. | True | |
| Sample bottles are completely filled. | True | |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs | True | |
| VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter. | N/A | |
| If necessary, staff have been informed of any short hold time or quick TAT needs | True | |
| Multiphasic samples are not present. | N/A | |
| Samples do not require splitting or compositing. | N/A | |
| Is the Field Sampler's name present on COC? | False | |
| Sample Preservation Verified | True | |

# Login Sample Receipt Check List

Client: Environmental Engineering Consultant Job Number: 660-33863-1

**Login Number: 33863**
**Creator: Alsheimer, Carl**
**List Number: 1**

**List Source: TestAmerica Tallahassee**
**List Creation: 02/18/10 08:26 AM**

| Question | T / F/ NA | Comment |
|---|---|---|
| Radioactivity either was not measured or, if measured, is at or below background | N/A | |
| The cooler's custody seal, if present, is intact. | True | |
| The cooler or samples do not appear to have been compromised or tampered with. | True | |
| Samples were received on ice. | True | |
| Cooler Temperature is acceptable. | True | |
| Cooler Temperature is recorded. | True | |
| COC is present. | True | |
| COC is filled out in ink and legible. | True | |
| COC is filled out with all pertinent information. | True | |
| There are no discrepancies between the sample IDs on the containers and the COC. | True | |
| Samples are received within Holding Time. | True | |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | |
| Sample collection date/times are provided. | True | |
| Appropriate sample containers are used. | True | |
| Sample bottles are completely filled. | True | |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs | True | |
| VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter. | N/A | |
| If necessary, staff have been informed of any short hold time or quick TAT needs | True | |
| Multiphasic samples are not present. | N/A | |
| Samples do not require splitting or compositing. | N/A | |
| Is the Field Sampler's name present on COC? | True | |
| Sample Preservation Verified | True | |

# ANALYTICAL REPORT

Job Number: 660-33886-1

Job Description: GHNS Barbados

For:
Environmental Engineering Consultant
5119 N. Florida Avenue
Tampa, FL 33603

Attention: Mr. Richard Pryor

Approved for release.
Nancy Robertson
Project Manager II
4/6/2010 11:50 AM

Nancy Robertson
Project Manager II
nancy.robertson@testamericainc.com
04/06/2010
Revision: 1

Methods: FDEP, DOH Certification #: TestAmerica Tampa E84282, TestAmerica Tallahassee E81005, TestAmerica Orlando E83012, TestAmerica Savannah E87052, TestAmerica Pensacola E81010

These test results meet all the requirements of NELAC unless specified in the case narrative. All questions regarding this test report should be directed to the TestAmerica Project Manager who signed this test report. The estimated uncertainty associated with these reported results is available upon request. The results contained in this test report relate only to these samples included herein.

**TestAmerica Laboratories, Inc.**
TestAmerica Tampa 6712 Benjamin Road, Suite 100, Tampa, FL 33634
Tel (813) 885-7427 Fax (813) 885-7049 www.testamericainc.com

## Job Narrative
## 660-33886-1

### Comments
No additional comments.

### Receipt
All samples were received in good condition within temperature requirements.

### GC Semi VOA
Method 8081A: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 90901 and 90902 were outside of control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria. The data are flagged with J3 qualifiers.

Method 8141: The laboratory control sample (LCS) for batch 640-65814 was outside of control limits for monochrotophos. The laboratories SOP allows for 3/20 analytes to recover outside of limits when a full analyte spike is run. The data are flagged with J3 qualifiers.

Method 8141: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 640-65855 were outside of control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria. The data are flagged with J3 qualifiers.

Method 8151A: The surrogate recovery for samples 3B, 4B and 4D were outside control limits bias high. The samples were non detect and are flagged with J1.

Method 8151A: The laboratory control sample (LCS) for batch 91293 was outside of control limits for dinoseb. The laboratories SOP allows for 3/20 analytes to recover outside of limits when a full analyte spike is run. The data are flagged with J3 qualifiers.

Method 8151A: The laboratory control sample / laboratory control sample duplicate (LCS/LCSD) for batch 90999 were outside of control limits for dalapon and MCPA. The laboratories SOP allows for 3/20 analytes to recover outside of limits when a full analyte spike is run. The data are flagged with J3 qualifiers.

Method 8151A: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 91293 were outside of control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria. The data are flagged with J3 qualifiers.

No other analytical or quality issues were noted.

### Metals
Method 6010B: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 90828 and 91336 were outside of control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria. The data are flagged with J3 qualifiers.

Method 7471A: The matrix spike duplicate (MSD) recovery for batch 91390 was outside of control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria. The data are flagged with J3 qualifiers.

No other analytical or quality issues were noted.

### RSK-175
The Method Blank contained an estimated result between the MDL and PQL for Carbon dioxide.
The samples are flagged with V.

### General Chemistry
Method 353.2 Nitrate, Nitrite: The samples were received with greater than 50% of holding time expired. . As such, the laboratory had insufficient time remaining to perform the analysis within holding time for sample 1. The data are flagged with Q qualifiers for this sample.

Method SM 5210B BOD: The samples were received with greater than 50% of holding time expired. As such, the laboratory had insufficient time remaining to perform the analysis within holding time. The data are flagged with Q qualifiers.

Method 10200H Chlorophyll-a: The samples were received with greater than 50% of holding time expired. As such, the laboratory had insufficient time remaining to perform the analysis within holding time. The data are flagged with Q qualifiers.

Method 350.1: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 680-161811 were outside of control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria. The data are flagged with J3 qualifiers.

Method 353.2: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 90906 were outside control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria. The data are flagged with J3 qualifiers.

Method SM 5220D: The matrix spike duplicate (MSD) recovery for batch 91132 was outside control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria. The data are flagged with J3 qualifiers.

Method SM 5220D: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 91274 were outside control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria.
The data are flagged with J3 qualifiers.

Method SM 4500 Cl- E: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 91159 were outside control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria. The data are flagged with J3 qualifiers.

Method SM 5550B: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 680-161223 were outside control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria. The data are flagged with J3 qualifiers.

No other analytical or quality issues were noted.

# EXECUTIVE SUMMARY - Detections

Client: Environmental Engineering Consultant Job Number: 660-33886-1

| Lab Sample ID Client Sample ID<br>Analyte | Result / Qualifier | | Reporting Limit | Units | Method |
|---|---|---|---|---|---|
| **660-33886-1** **2A** | | | | | |
| Aluminum | 9100 | | 20 | mg/Kg | 6010B |
| Arsenic | 0.78 | | 0.49 | mg/Kg | 6010B |
| Boron | 7.5 | | 4.9 | mg/Kg | 6010B |
| Barium | 21 | | 0.98 | mg/Kg | 6010B |
| Calcium | 92000 | | 490 | mg/Kg | 6010B |
| Cadmium | 0.26 | I | 0.49 | mg/Kg | 6010B |
| Cobalt | 2.0 | | 0.98 | mg/Kg | 6010B |
| Chromium | 4.7 | | 0.98 | mg/Kg | 6010B |
| Copper | 12 | | 2.0 | mg/Kg | 6010B |
| Iron | 4900 | | 4.9 | mg/Kg | 6010B |
| Magnesium | 2100 | | 49 | mg/Kg | 6010B |
| Manganese | 170 | | 0.98 | mg/Kg | 6010B |
| Sodium | 890 | | 49 | mg/Kg | 6010B |
| Lead | 13 | | 0.49 | mg/Kg | 6010B |
| Strontium | 2700 | | 39 | mg/Kg | 6010B |
| Titanium | 130 | | 0.98 | mg/Kg | 6010B |
| Vanadium | 16 | | 0.98 | mg/Kg | 6010B |
| Zinc | 13 | | 2.0 | mg/Kg | 6010B |
| Mercury | 0.023 | | 0.019 | mg/Kg | 7471A |
| Ammonia (as N) | 2.1 | | 0.30 | mg/Kg | 350.1 |
| Phosphorus | 2300 | | 91 | mg/Kg | 365.4 |
| Total Organic Carbon | 35000 | | 3000 | mg/Kg | 9060 |
| Percent Solids | 37 | | 0.10 | % | Moisture |
| ***Soluble*** | | | | | |
| Nitrite as N-Soluble | 1.5 | I | 5.0 | mg/Kg | 353.2 |
| pH-Soluble | 8.11 | Q | 1.00 | SU | 9045C |
| Orthophosphate-Soluble | 3.5 | | 3.0 | mg/L | SM 4500 P E |

# EXECUTIVE SUMMARY - Detections

Client: Environmental Engineering Consultant Job Number: 660-33886-1

| Lab Sample ID<br>Analyte | Client Sample ID | Result | Qualifier | Reporting Limit | Units | Method |
|---|---|---|---|---|---|---|
| **660-33886-2** | **1** | | | | | |
| Aluminum | | 9700 | | 20 | mg/Kg | 6010B |
| Arsenic | | 0.54 | | 0.49 | mg/Kg | 6010B |
| Boron | | 2.9 | I | 4.9 | mg/Kg | 6010B |
| Barium | | 18 | | 0.98 | mg/Kg | 6010B |
| Calcium | | 23000 | | 490 | mg/Kg | 6010B |
| Cadmium | | 0.18 | I | 0.49 | mg/Kg | 6010B |
| Cobalt | | 3.4 | | 0.98 | mg/Kg | 6010B |
| Chromium | | 4.1 | | 0.98 | mg/Kg | 6010B |
| Copper | | 17 | | 2.0 | mg/Kg | 6010B |
| Iron | | 6200 | | 4.9 | mg/Kg | 6010B |
| Magnesium | | 1700 | | 49 | mg/Kg | 6010B |
| Manganese | | 200 | | 0.98 | mg/Kg | 6010B |
| Sodium | | 300 | | 49 | mg/Kg | 6010B |
| Lead | | 9.9 | | 0.49 | mg/Kg | 6010B |
| Strontium | | 810 | | 9.8 | mg/Kg | 6010B |
| Titanium | | 68 | | 0.98 | mg/Kg | 6010B |
| Vanadium | | 14 | | 0.98 | mg/Kg | 6010B |
| Zinc | | 15 | | 2.0 | mg/Kg | 6010B |
| Mercury | | 0.019 | I | 0.020 | mg/Kg | 7471A |
| Ammonia (as N) | | 65 | | 3.0 | mg/Kg | 350.1 |
| Phosphorus | | 690 | | 19 | mg/Kg | 365.4 |
| Sulfide | | 47 | | 25 | mg/Kg | 9034 |
| Total Organic Carbon | | 42000 | | 3000 | mg/Kg | 9060 |
| Percent Solids | | 22 | | 0.10 | % | Moisture |
| ***Soluble*** | | | | | | |
| pH-Soluble | | 7.89 | Q | 1.00 | SU | 9045C |
| Orthophosphate-Soluble | | 1.6 | I | 3.0 | mg/L | SM 4500 P E |

# EXECUTIVE SUMMARY - Detections

Client: Environmental Engineering Consultant Job Number: 660-33886-1

| Lab Sample ID Analyte | Client Sample ID | Result / Qualifier | | Reporting Limit | Units | Method |
|---|---|---|---|---|---|---|
| **660-33886-3** | **3A** | | | | | |
| Aluminum | | 360 | | 20 | mg/Kg | 6010B |
| Arsenic | | 0.25 | I | 0.50 | mg/Kg | 6010B |
| Boron | | 13 | | 5.0 | mg/Kg | 6010B |
| Barium | | 3.3 | | 0.99 | mg/Kg | 6010B |
| Calcium | | 9100 | | 50 | mg/Kg | 6010B |
| Cobalt | | 0.19 | I | 0.99 | mg/Kg | 6010B |
| Chromium | | 0.41 | I | 0.99 | mg/Kg | 6010B |
| Copper | | 2.1 | | 2.0 | mg/Kg | 6010B |
| Iron | | 290 | | 5.0 | mg/Kg | 6010B |
| Magnesium | | 780 | | 50 | mg/Kg | 6010B |
| Manganese | | 14 | | 0.99 | mg/Kg | 6010B |
| Sodium | | 820 | | 50 | mg/Kg | 6010B |
| Lead | | 3.9 | | 0.50 | mg/Kg | 6010B |
| Strontium | | 380 | | 9.9 | mg/Kg | 6010B |
| Titanium | | 7.1 | | 0.99 | mg/Kg | 6010B |
| Vanadium | | 2.1 | | 0.99 | mg/Kg | 6010B |
| Zinc | | 6.0 | | 2.0 | mg/Kg | 6010B |
| Mercury | | 0.011 | I | 0.019 | mg/Kg | 7471A |
| Ammonia (as N) | | 6.9 | | 0.30 | mg/Kg | 350.1 |
| Phosphorus | | 240 | | 17 | mg/Kg | 365.4 |
| Total Organic Carbon | | 210000 | | 3000 | mg/Kg | 9060 |
| Percent Solids | | 6.6 | | 0.10 | % | Moisture |
| ***Soluble*** | | | | | | |
| pH-Soluble | | 7.84 | Q | 1.00 | SU | 9045C |
| Orthophosphate-Soluble | | 0.87 | I | 3.0 | mg/L | SM 4500 P E |

# EXECUTIVE SUMMARY - Detections

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

| Lab Sample ID<br>Analyte | Client Sample ID | Result / Qualifier | | Reporting Limit | Units | Method |
|---|---|---|---|---|---|---|
| **660-33886-4** | **4B** | | | | | |
| Dieldrin | | 0.19 | I | 1.7 | ug/Kg | 8081A |
| Aluminum | | 1300 | | 20 | mg/Kg | 6010B |
| Arsenic | | 0.64 | | 0.50 | mg/Kg | 6010B |
| Boron | | 7.7 | | 5.0 | mg/Kg | 6010B |
| Barium | | 3.7 | | 1.0 | mg/Kg | 6010B |
| Calcium | | 14000 | | 50 | mg/Kg | 6010B |
| Cobalt | | 0.52 | I | 1.0 | mg/Kg | 6010B |
| Chromium | | 2.2 | | 1.0 | mg/Kg | 6010B |
| Copper | | 9.2 | | 2.0 | mg/Kg | 6010B |
| Iron | | 1200 | | 5.0 | mg/Kg | 6010B |
| Magnesium | | 640 | | 50 | mg/Kg | 6010B |
| Manganese | | 17 | | 1.0 | mg/Kg | 6010B |
| Sodium | | 640 | | 50 | mg/Kg | 6010B |
| Lead | | 27 | | 0.50 | mg/Kg | 6010B |
| Strontium | | 260 | | 10 | mg/Kg | 6010B |
| Titanium | | 25 | | 1.0 | mg/Kg | 6010B |
| Vanadium | | 5.7 | | 1.0 | mg/Kg | 6010B |
| Zinc | | 28 | | 2.0 | mg/Kg | 6010B |
| Mercury | | 0.029 | | 0.019 | mg/Kg | 7471A |
| Ammonia (as N) | | 11 | | 0.60 | mg/Kg | 350.1 |
| Phosphorus | | 140 | | 20 | mg/Kg | 365.4 |
| Total Organic Carbon | | 150000 | | 3000 | mg/Kg | 9060 |
| Percent Solids | | 8.6 | | 0.10 | % | Moisture |
| ***Soluble*** | | | | | | |
| pH-Soluble | | 7.53 | Q | 1.00 | SU | 9045C |
| Orthophosphate-Soluble | | 1.5 | I | 3.0 | mg/L | SM 4500 P E |
| **660-33886-5** | **SB** | | | | | |
| Ammonia (as N) | | 0.13 | | 0.020 | mg/L | 350.1 |
| Nitrate as N | | 3.3 | | 0.50 | mg/L | 353.2 |
| Total Organic Carbon | | 0.46 | I | 1.0 | mg/L | SM 5310C |
| ***Total Recoverable*** | | | | | | |
| Aluminum | | 0.17 | I | 0.20 | mg/L | 6010B |
| Boron | | 0.056 | | 0.050 | mg/L | 6010B |
| Calcium | | 0.68 | | 0.50 | mg/L | 6010B |
| Iron | | 0.095 | I | 0.20 | mg/L | 6010B |
| Magnesium | | 0.051 | I | 0.080 | mg/L | 6010B |
| Manganese | | 0.0021 | I | 0.0040 | mg/L | 6010B |
| Sodium | | 26 | | 0.50 | mg/L | 6010B |
| Strontium | | 0.016 | | 0.0050 | mg/L | 6010B |
| Titanium | | 0.0044 | I | 0.010 | mg/L | 6010B |
| Zinc | | 0.026 | | 0.020 | mg/L | 6010B |

# EXECUTIVE SUMMARY - Detections

Client: Environmental Engineering Consultant Job Number: 660-33886-1

| Lab Sample ID Client Sample ID<br>Analyte | Result / Qualifier | | Reporting Limit | Units | Method |
|---|---|---|---|---|---|
| **660-33886-6 2A** | | | | | |
| Carbon dioxide (as CO2) | 200 | V | 50 | ug/L | RSK-175 |
| Dieldrin | 0.035 | | 0.0098 | ug/L | 8081A |
| Turbidity | 4.9 | | 0.10 | NTU | 180.1 |
| Nitrate as N | 0.33 | I | 0.50 | mg/L | 353.2 |
| Phosphorus, Total | 0.21 | I | 0.30 | mg/L | 365.4 |
| Biochemical Oxygen Demand | 4.38 | Q | 2.00 | mg/L | 405.1 |
| Chlorophyll a | 25.3 | Q | 2.00 | ug/L | SM 10200H |
| Alkalinity | 340 | | 1.0 | mg/L | SM 2320B |
| Total Suspended Solids | 11 | | 1.0 | mg/L | SM 2540D |
| Sulfate | 45 | | 10 | mg/L | SM 426C |
| Chloride | 89 | | 10 | mg/L | SM 4500 Cl- E |
| Chemical Oxygen Demand | 15 | I | 20 | mg/L | SM 5220D |
| Tannins and Lignins | 0.70 | | 0.10 | mg/L | SM 5550B |
| ***Total Recoverable*** | | | | | |
| Copper | 0.0034 | I | 0.010 | mg/L | 6010B |
| Iron | 1.2 | | 0.20 | mg/L | 6010B |
| Potassium | 8.2 | | 1.0 | mg/L | 6010B |
| Magnesium | 32 | | 0.080 | mg/L | 6010B |
| Sodium | 85 | | 0.50 | mg/L | 6010B |
| Zinc | 0.024 | | 0.020 | mg/L | 6010B |
| **660-33886-7 1** | | | | | |
| Carbon dioxide (as CO2) | 130 | V | 50 | ug/L | RSK-175 |
| Dieldrin | 0.0027 | I | 0.0096 | ug/L | 8081A |
| Turbidity | 11 | | 0.10 | NTU | 180.1 |
| Phosphorus, Total | 0.13 | I | 0.30 | mg/L | 365.4 |
| Biochemical Oxygen Demand | 7.38 | Q | 2.00 | mg/L | 405.1 |
| Chlorophyll a | 137 | Q | 2.00 | ug/L | SM 10200H |
| Alkalinity | 210 | | 1.0 | mg/L | SM 2320B |
| Total Suspended Solids | 32 | | 1.0 | mg/L | SM 2540D |
| Sulfate | 50 | | 10 | mg/L | SM 426C |
| Chloride | 140 | | 10 | mg/L | SM 4500 Cl- E |
| Chemical Oxygen Demand | 44 | | 20 | mg/L | SM 5220D |
| Tannins and Lignins | 0.92 | | 0.10 | mg/L | SM 5550B |
| ***Total Recoverable*** | | | | | |
| Copper | 0.0045 | I | 0.010 | mg/L | 6010B |
| Iron | 1.5 | | 0.20 | mg/L | 6010B |
| Potassium | 12 | | 1.0 | mg/L | 6010B |
| Magnesium | 37 | | 0.080 | mg/L | 6010B |
| Sodium | 110 | | 1.0 | mg/L | 6010B |
| Zinc | 0.033 | | 0.020 | mg/L | 6010B |

# EXECUTIVE SUMMARY - Detections

Client: Environmental Engineering Consultant Job Number: 660-33886-1

| Lab Sample ID Client Sample ID<br>Analyte | Result / Qualifier | | Reporting Limit | Units | Method |
|---|---|---|---|---|---|
| **660-33886-8 3B** | | | | | |
| Carbon dioxide (as CO2) | 36 | I V | 50 | ug/L | RSK-175 |
| Turbidity | 2.9 | | 0.10 | NTU | 180.1 |
| Phosphorus, Total | 0.12 | I | 0.30 | mg/L | 365.4 |
| Biochemical Oxygen Demand | 4.64 | Q | 2.00 | mg/L | 405.1 |
| Chlorophyll a | 22.6 | Q | 2.00 | ug/L | SM 10200H |
| Alkalinity | 440 | | 1.0 | mg/L | SM 2320B |
| Salinity | 2.5 | | 2.0 | ppt | SM 2520B |
| Total Suspended Solids | 8.4 | | 1.0 | mg/L | SM 2540D |
| Sulfate | 140 | | 25 | mg/L | SM 426C |
| Chloride | 960 | | 100 | mg/L | SM 4500 Cl- E |
| Chemical Oxygen Demand | 48 | | 20 | mg/L | SM 5220D |
| Tannins and Lignins | 1.6 | | 0.10 | mg/L | SM 5550B |
| ***Total Recoverable*** | | | | | |
| Iron | 0.055 | I | 0.20 | mg/L | 6010B |
| Potassium | 32 | | 20 | mg/L | 6010B |
| Magnesium | 90 | | 0.080 | mg/L | 6010B |
| Sodium | 600 | | 10 | mg/L | 6010B |
| Zinc | 0.017 | I | 0.020 | mg/L | 6010B |
| **660-33886-9 3A** | | | | | |
| Carbon dioxide (as CO2) | 35 | I V | 50 | ug/L | RSK-175 |
| Turbidity | 2.9 | | 0.10 | NTU | 180.1 |
| Phosphorus, Total | 0.15 | I | 0.30 | mg/L | 365.4 |
| Biochemical Oxygen Demand | 2.58 | Q | 2.00 | mg/L | 405.1 |
| Chlorophyll a | 21.1 | Q | 2.00 | ug/L | SM 10200H |
| Alkalinity | 440 | | 1.0 | mg/L | SM 2320B |
| Salinity | 2.5 | | 2.0 | ppt | SM 2520B |
| Total Suspended Solids | 18 | | 1.0 | mg/L | SM 2540D |
| Sulfate | 140 | | 25 | mg/L | SM 426C |
| Chloride | 1000 | | 100 | mg/L | SM 4500 Cl- E |
| Chemical Oxygen Demand | 51 | | 20 | mg/L | SM 5220D |
| Tannins and Lignins | 1.5 | | 0.10 | mg/L | SM 5550B |
| ***Total Recoverable*** | | | | | |
| Iron | 0.068 | I | 0.20 | mg/L | 6010B |
| Potassium | 32 | | 20 | mg/L | 6010B |
| Magnesium | 91 | | 0.080 | mg/L | 6010B |
| Sodium | 610 | | 10 | mg/L | 6010B |

# EXECUTIVE SUMMARY - Detections

Client: Environmental Engineering Consultant Job Number: 660-33886-1

| Lab Sample ID Client Sample ID<br>Analyte | Result / Qualifier | | Reporting Limit | Units | Method |
|---|---|---|---|---|---|
| **660-33886-10 4B** | | | | | |
| Carbon dioxide (as CO2) | 200 | V | 50 | ug/L | RSK-175 |
| Turbidity | 12 | | 0.10 | NTU | 180.1 |
| Phosphorus, Total | 0.26 | I | 0.30 | mg/L | 365.4 |
| Biochemical Oxygen Demand | 6.55 | Q | 2.00 | mg/L | 405.1 |
| Chlorophyll a | 4.40 | Q | 2.00 | ug/L | SM 10200H |
| Alkalinity | 650 | | 1.0 | mg/L | SM 2320B |
| Salinity | 2.0 | | 2.0 | ppt | SM 2520B |
| Total Suspended Solids | 39 | | 1.0 | mg/L | SM 2540D |
| Sulfate | 110 | | 25 | mg/L | SM 426C |
| Chloride | 590 | | 100 | mg/L | SM 4500 Cl- E |
| Sulfide | 1.3 | | 1.0 | mg/L | SM 4500 S2 F |
| Chemical Oxygen Demand | 270 | | 20 | mg/L | SM 5220D |
| Tannins and Lignins | 4.4 | | 0.50 | mg/L | SM 5550B |
| ***Total Recoverable*** | | | | | |
| Copper | 0.044 | | 0.010 | mg/L | 6010B |
| Iron | 5.1 | | 0.20 | mg/L | 6010B |
| Potassium | 49 | | 1.0 | mg/L | 6010B |
| Magnesium | 86 | | 0.080 | mg/L | 6010B |
| Sodium | 440 | | 10 | mg/L | 6010B |
| Lead | 0.095 | | 0.010 | mg/L | 6010B |
| Zinc | 0.14 | | 0.020 | mg/L | 6010B |
| **660-33886-11 5A** | | | | | |
| Carbon dioxide (as CO2) | 13 | I V | 50 | ug/L | RSK-175 |
| Dieldrin | 0.0034 | I | 0.011 | ug/L | 8081A |
| Turbidity | 46 | | 0.20 | NTU | 180.1 |
| Phosphorus, Total | 0.23 | I | 0.30 | mg/L | 365.4 |
| Biochemical Oxygen Demand | 8.84 | Q | 2.00 | mg/L | 405.1 |
| Chlorophyll a | 22.0 | Q | 2.00 | ug/L | SM 10200H |
| Alkalinity | 210 | | 1.0 | mg/L | SM 2320B |
| Total Suspended Solids | 280 | | 4.2 | mg/L | SM 2540D |
| Sulfate | 48 | | 20 | mg/L | SM 426C |
| Chloride | 110 | | 10 | mg/L | SM 4500 Cl- E |
| Chemical Oxygen Demand | 34 | | 20 | mg/L | SM 5220D |
| Tannins and Lignins | 0.51 | | 0.10 | mg/L | SM 5550B |
| ***Total Recoverable*** | | | | | |
| Copper | 0.012 | | 0.010 | mg/L | 6010B |
| Iron | 8.5 | | 0.20 | mg/L | 6010B |
| Potassium | 10 | | 1.0 | mg/L | 6010B |
| Magnesium | 30 | | 0.080 | mg/L | 6010B |
| Sodium | 97 | | 0.50 | mg/L | 6010B |
| Lead | 0.0099 | I | 0.010 | mg/L | 6010B |
| Zinc | 0.049 | | 0.020 | mg/L | 6010B |

# EXECUTIVE SUMMARY - Detections

Client: Environmental Engineering Consultant Job Number: 660-33886-1

| Lab Sample ID Client Sample ID<br>Analyte | Result | Qualifier | Reporting Limit | Units | Method |
|---|---|---|---|---|---|
| **660-33886-12 4D** | | | | | |
| Carbon dioxide (as CO2) | 230 | V | 50 | ug/L | RSK-175 |
| Turbidity | 8.0 | | 0.10 | NTU | 180.1 |
| Phosphorus, Total | 0.55 | | 0.30 | mg/L | 365.4 |
| Biochemical Oxygen Demand | 11.5 | Q | 2.00 | mg/L | 405.1 |
| Chlorophyll a | 40.7 | Q | 2.00 | ug/L | SM 10200H |
| Alkalinity | 540 | | 1.0 | mg/L | SM 2320B |
| Total Suspended Solids | 8.0 | | 1.0 | mg/L | SM 2540D |
| Sulfate | 69 | | 10 | mg/L | SM 426C |
| Chloride | 500 | | 100 | mg/L | SM 4500 Cl- E |
| Chemical Oxygen Demand | 55 | | 20 | mg/L | SM 5220D |
| Tannins and Lignins | 4.0 | | 0.50 | mg/L | SM 5550B |
| ***Total Recoverable*** | | | | | |
| Iron | 0.068 | I | 0.20 | mg/L | 6010B |
| Potassium | 33 | | 1.0 | mg/L | 6010B |
| Magnesium | 68 | | 0.080 | mg/L | 6010B |
| Sodium | 340 | | 5.0 | mg/L | 6010B |

# METHOD SUMMARY

Client: Environmental Engineering Consultant	Job Number: 660-33886-1

| Description | Lab Location | Method | Preparation Method |
|---|---|---|---|
| **Matrix Solid** | | | |
| Organochlorine Pesticides (GC) | TAL TAM | SW846 8081A | |
| Ultrasonic Extraction | TAL TAM | | SW846 3550B |
| Organophosphorous Pesticides (GC) | TAL TAL | SW846 8141A | |
| Ultrasonic Extraction | TAL TAL | | SW846 3550B |
| Herbicides (GC) | TAL TAM | SW846 8151A | |
| Extraction (Herbicides) | TAL TAM | | SW846 8151A |
| Metals (ICP) | TAL TAM | SW846 6010B | |
| Preparation, Metals | TAL TAM | | SW846 3050B |
| Mercury (CVAA) | TAL TAM | SW846 7471A | |
| Preparation, Mercury | TAL TAM | | SW846 7471A |
| Nitrogen, Ammonia | TAL SAV | MCAWW 350.1 | |
| Ammonia ( Sediments) | TAL SAV | | EPA 3-154 |
| Nitrogen, Nitrate-Nitrite | TAL TAM | MCAWW 353.2 | |
| Deionized Water Leaching Procedure | TAL TAM | | ASTM DI Leach |
| Phosphorus, Total | TAL SAV | EPA 365.4 | |
| Phosphorus, Total | TAL SAV | | MCAWW 365.2/365.3/365 |
| Sulfide, Acid Soluble and Insoluble (Titrimetric) | TAL SAV | SW846 9034 | |
| Sulfide, Distillation (Acid Soluble and Insoluble) | TAL SAV | | SW846 9030B |
| Sulfate, Turbidimetric | TAL SAV | SW846 9038 | |
| Deionized Water Leaching Procedure | TAL SAV | | ASTM DI Leach |
| pH | TAL TAM | SW846 9045C | |
| Deionized Water Leaching Procedure | TAL TAM | | ASTM DI Leach |
| Organic Carbon, Total (TOC) | TAL SAV | SW846 9060 | |
| Percent Moisture | TAL TAM | EPA Moisture | |
| Orthophosphate | TAL TAM | SM SM 4500 P E | |
| Deionized Water Leaching Procedure | TAL TAM | | ASTM DI Leach |
| **Matrix Water** | | | |
| Dissolved Gases (GC) | TAL PEN | RSK RSK-175 | |
| Organochlorine Pesticides (GC) | TAL TAM | SW846 8081A | |
| Liquid-Liquid Extraction (Separatory Funnel) | TAL TAM | | SW846 3510C |
| Organophosphorous Pesticides (GC) | TAL TAL | SW846 8141A | |
| Liquid-Liquid Extraction (Continuous) | TAL TAL | | SW846 3520C |
| Herbicides (GC) | TAL TAM | SW846 8151A | |
| Extraction (Herbicides) | TAL TAM | | SW846 8151A |
| Metals (ICP) | TAL TAM | SW846 6010B | |
| Preparation, Total Recoverable or Dissolved Metals | TAL TAM | | SW846 3005A |
| Mercury | TAL TAM | SW846 7470A | |
| Preparation, Mercury | TAL TAM | | SW846 7470A |
| Turbidity, Nephelometric | TAL TAM | MCAWW 180.1 | |

# METHOD SUMMARY

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

| Description | Lab Location | Method | Preparation Method |
|---|---|---|---|
| **Matrix Water** | | | |
| Nitrogen, Ammonia | TAL TAM | MCAWW 350.1 | |
| Nitrite | TAL TAM | MCAWW 353.2 | |
| Phosphorus, Ortho | TAL TAM | EPA 365.1 | |
| Sample Filtration, Field | TAL TAM | | FIELD_FLTRD |
| Phosphorus, Total | TAL TAM | EPA 365.4 | |
| Phosphorus, Total | TAL TAM | | MCAWW 365.2/365.3/365 |
| BOD-5 | TAL ORL | EPA 405.1 | |
| Chlorophyll-a | TAL ORL | SM SM 10200H | |
| Alkalinity | TAL TAM | SM SM 2320B | |
| Salinity | TAL TAM | SM SM 2520B | |
| Solids, Total Suspended (TSS) | TAL TAM | SM SM 2540D | |
| Sulfate | TAL TAM | SM SM 426C | |
| Chloride, Total | TAL TAM | SM SM 4500 Cl- E | |
| Sulfide, Total | TAL TAM | SM SM 4500 S2 F | |
| COD | TAL TAM | SM SM 5220D | |
| COD | TAL TAM | | SM SM 5220 |
| TOC | TAL TAL | SM SM 5310C | |
| Tannin and Lignin | TAL SAV | SM SM 5550B | |

## Lab References:

TAL ORL = TestAmerica Orlando

TAL PEN = TestAmerica Pensacola

TAL SAV = TestAmerica Savannah

TAL TAL = TestAmerica Tallahassee

TAL TAM = TestAmerica Tampa

## Method References:

ASTM = ASTM International

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

RSK = Sample Prep And Calculations For Dissolved Gas Analysis In Water Samples Using A GC Headspace Equilibration Technique, RSKSOP-175, Rev. 0, 8/11/94, USEPA Research Lab

SM = "Standard Methods For The Examination Of Water And Wastewater",

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

# METHOD / ANALYST SUMMARY

Client: Environmental Engineering Consultant　Job Number: 660-33886-1

| Method | Analyst | Analyst ID |
|---|---|---|
| RSK RSK-175 | Ayers, Kim | KA |
| SW846 8081A | Myers, Randy | RM |
| SW846 8141A | Thomas, Martin L | MLT |
| SW846 8151A | Myers, Randy | RM |
| SW846 6010B | Ramos, Salvador | SR |
| SW846 7470A | Wieland, Kristen | KW |
| SW846 7471A | Wieland, Kristen | KW |
| MCAWW 180.1 | Cerome, Saurel | SC |
| MCAWW 350.1 | Ross, Jon | JR |
| MCAWW 350.1 | Steward, Tiffany | TS |
| MCAWW 353.2 | Steward, Tiffany | TS |
| EPA 365.1 | Sengsouvanna, Dom | DS |
| EPA 365.4 | Martin, Randolph | RM |
| EPA 365.4 | Ross, Jon | JR |
| EPA 405.1 | ANALYST, SUBCONTRACTED | SUB |
| SW846 9034 | Vasquez, Juana | JV |
| SW846 9038 | Ross, Jon | JR |
| SW846 9045C | Sengsouvanna, Dom | DS |
| SW846 9060 | Blackshear, Kim | KB |
| EPA Moisture | Volz, Charles | CV |
| SM SM 10200H | ANALYST, SUBCONTRACTED | SUB |
| SM SM 2320B | Steward, Tiffany | TS |
| SM SM 2520B | Mostafavifar, Efe | EM |
| SM SM 2540D | Oonnoonny, Thomas | TO |
| SM SM 426C | Cerome, Saurel | SC |
| SM SM 4500 Cl- E | Mostafavifar, Efe | EM |
| SM SM 4500 P E | Mostafavifar, Efe | EM |
| SM SM 4500 S2 F | Mostafavifar, Efe | EM |
| SM SM 5220D | Cerome, Saurel | SC |
| SM SM 5310C | Frank, Michelle | MF |

# METHOD / ANALYST SUMMARY

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

| Method | Analyst | Analyst ID |
|---|---|---|
| SM SM 5550B | Ross, Jon | JR |

# SAMPLE SUMMARY

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

| Lab Sample ID | Client Sample ID | Client Matrix | Date/Time Sampled | Date/Time Received |
|---|---|---|---|---|
| 660-33886-1 | 2A | Solid | 02/16/2010 1110 | 02/18/2010 0905 |
| 660-33886-2 | 1 | Solid | 02/16/2010 1010 | 02/18/2010 0905 |
| 660-33886-3 | 3A | Solid | 02/16/2010 1300 | 02/18/2010 0905 |
| 660-33886-4 | 4B | Solid | 02/16/2010 1400 | 02/18/2010 0905 |
| 660-33886-5 | SB | Water | 02/16/2010 1530 | 02/18/2010 0905 |
| 660-33886-6 | 2A | Water | 02/16/2010 1100 | 02/18/2010 0905 |
| 660-33886-7 | 1 | Water | 02/16/2010 1000 | 02/18/2010 0905 |
| 660-33886-8 | 3B | Water | 02/16/2010 1220 | 02/18/2010 0905 |
| 660-33886-9 | 3A | Water | 02/16/2010 1240 | 02/18/2010 0905 |
| 660-33886-10 | 4B | Water | 02/16/2010 1350 | 02/18/2010 0905 |
| 660-33886-11 | 5A | Water | 02/16/2010 1330 | 02/18/2010 0905 |
| 660-33886-12 | 4D | Water | 02/16/2010 1440 | 02/18/2010 0905 |

## Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Client Sample ID:** **2A**

Lab Sample ID: 660-33886-6

Client Matrix: Water

Date Sampled: 02/16/2010 1100

Date Received: 02/18/2010 0905

### RSK-175 Dissolved Gases (GC)

Method: RSK-175

Preparation: N/A

Dilution: 1.0

Date Analyzed: 02/26/2010 1013

Date Prepared:

Analysis Batch: 400-104462

Instrument ID: NOEQUIP

Lab File ID: N/A

Initial Weight/Volume: 1.0 mL

Final Weight/Volume: 1.0 mL

Injection Volume:

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Carbon dioxide (as CO2) | 200 | V | 7.0 | 50 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Client Sample ID:** **1**

Lab Sample ID: 660-33886-7
Client Matrix: Water

Date Sampled: 02/16/2010 1000
Date Received: 02/18/2010 0905

### RSK-175 Dissolved Gases (GC)

| | | | | |
|---|---|---|---|---|
| Method: | RSK-175 | Analysis Batch: 400-104462 | Instrument ID: | NOEQUIP |
| Preparation: | N/A | | Lab File ID: | N/A |
| Dilution: | 1.0 | | Initial Weight/Volume: | 1.0 mL |
| Date Analyzed: | 02/26/2010 1025 | | Final Weight/Volume: | 1.0 mL |
| Date Prepared: | | | Injection Volume: | |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Carbon dioxide (as CO2) | 130 | V | 7.0 | 50 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Client Sample ID:** **3B**

Lab Sample ID: 660-33886-8
Client Matrix: Water

Date Sampled: 02/16/2010 1220
Date Received: 02/18/2010 0905

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### RSK-175 Dissolved Gases (GC)

Method: RSK-175
Preparation: N/A
Dilution: 1.0
Date Analyzed: 02/26/2010 1037
Date Prepared:

Analysis Batch: 400-104462

Instrument ID: NOEQUIP
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL
Injection Volume:

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Carbon dioxide (as CO2) | 36 | I V | 7.0 | 50 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Client Sample ID: 3A**

Lab Sample ID: 660-33886-9

Client Matrix: Water

Date Sampled: 02/16/2010 1240

Date Received: 02/18/2010 0905

---

## RSK-175 Dissolved Gases (GC)

Method: RSK-175

Preparation: N/A

Dilution: 1.0

Date Analyzed: 02/26/2010 1049

Date Prepared:

Analysis Batch: 400-104462

Instrument ID: NOEQUIP

Lab File ID: N/A

Initial Weight/Volume: 1.0 mL

Final Weight/Volume: 1.0 mL

Injection Volume:

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Carbon dioxide (as CO2) | 35 | I V | 7.0 | 50 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Client Sample ID:** **4B**

Lab Sample ID: 660-33886-10

Client Matrix: Water

Date Sampled: 02/16/2010 1350

Date Received: 02/18/2010 0905

---

**RSK-175 Dissolved Gases (GC)**

Method: RSK-175

Preparation: N/A

Dilution: 1.0

Date Analyzed: 02/26/2010 1101

Date Prepared:

Analysis Batch: 400-104462

Instrument ID: NOEQUIP

Lab File ID: N/A

Initial Weight/Volume: 1.0 mL

Final Weight/Volume: 1.0 mL

Injection Volume:

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Carbon dioxide (as CO2) | 200 | V | 7.0 | 50 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Client Sample ID:** **5A**

Lab Sample ID: 660-33886-11
Client Matrix: Water

Date Sampled: 02/16/2010 1330
Date Received: 02/18/2010 0905

---

**RSK-175 Dissolved Gases (GC)**

| | | | | |
|---|---|---|---|---|
| Method: | RSK-175 | Analysis Batch: 400-104462 | Instrument ID: | NOEQUIP |
| Preparation: | N/A | | Lab File ID: | N/A |
| Dilution: | 1.0 | | Initial Weight/Volume: | 1.0 mL |
| Date Analyzed: | 02/26/2010 1112 | | Final Weight/Volume: | 1.0 mL |
| Date Prepared: | | | Injection Volume: | |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Carbon dioxide (as CO2) | 13 | I V | 7.0 | 50 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Client Sample ID:** **4D**

Lab Sample ID: 660-33886-12

Client Matrix: Water

Date Sampled: 02/16/2010 1440

Date Received: 02/18/2010 0905

---

### RSK-175 Dissolved Gases (GC)

| | | | | |
|---|---|---|---|---|
| Method: | RSK-175 | Analysis Batch: 400-104462 | Instrument ID: | NOEQUIP |
| Preparation: | N/A | | Lab File ID: | N/A |
| Dilution: | 1.0 | | Initial Weight/Volume: | 1.0 mL |
| Date Analyzed: | 02/26/2010 1213 | | Final Weight/Volume: | 1.0 mL |
| Date Prepared: | | | Injection Volume: | |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Carbon dioxide (as CO2) | 230 | V | 7.0 | 50 |

**Client Sample ID:** **2A**

Lab Sample ID: 660-33886-1
Client Matrix: Solid

Date Sampled: 02/16/2010 1110
Date Received: 02/18/2010 0905

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## 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91299 | Instrument ID: | BSGJ |
| Preparation: | 3550B | Prep Batch: 660-90901 | Initial Weight/Volume: | 30.36 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/25/2010 0416 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0654 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| 4,4'-DDD | | 0.49 | U | 0.49 | 3.3 |
| 4,4'-DDE | | 0.49 | U | 0.49 | 3.3 |
| 4,4'-DDT | | 0.49 | U | 0.49 | 3.3 |
| Aldrin | | 0.49 | U | 0.49 | 2.0 |
| alpha-BHC | | 0.14 | U | 0.14 | 1.7 |
| beta-BHC | | 0.49 | U | 0.49 | 2.0 |
| Chlordane (technical) | | 2.4 | U | 2.4 | 17 |
| delta-BHC | | 0.49 | U | 0.49 | 2.0 |
| Dieldrin | | 0.15 | U | 0.15 | 1.7 |
| Endosulfan I | | 0.25 | U | 0.25 | 2.0 |
| Endosulfan II | | 0.25 | U | 0.25 | 3.3 |
| Endosulfan sulfate | | 0.25 | U | 0.25 | 3.3 |
| Endrin | | 0.49 | U | 0.49 | 4.0 |
| Endrin aldehyde | | 0.49 | U | 0.49 | 4.0 |
| Endrin ketone | | 0.49 | U | 0.49 | 4.0 |
| gamma-BHC (Lindane) | | 0.49 | U | 0.49 | 2.0 |
| Heptachlor | | 0.49 | U | 0.49 | 2.0 |
| Heptachlor epoxide | | 0.14 | U | 0.14 | 2.0 |
| Methoxychlor | | 0.99 | U | 0.99 | 17 |
| Toxaphene | | 29 | U | 29 | 170 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 70 | | 30 - 150 |
| Tetrachloro-m-xylene | 82 | | 30 - 150 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Client Sample ID:** **1**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33886-2 | Date Sampled: | 02/16/2010 1010 |
| Client Matrix: | Solid | Date Received: | 02/18/2010 0905 |

---

## 8081A Organochlorine Pesticides (GC)

| | | | | | |
|---|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: | 660-91299 | Instrument ID: | BSGJ |
| Preparation: | 3550B | Prep Batch: | 660-90901 | Initial Weight/Volume: | 30.00 g |
| Dilution: | 1.0 | | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/25/2010 0429 | | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0654 | | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| 4,4'-DDD | | 0.50 | U | 0.50 | 3.3 |
| 4,4'-DDE | | 0.50 | U | 0.50 | 3.3 |
| 4,4'-DDT | | 0.50 | U | 0.50 | 3.3 |
| Aldrin | | 0.50 | U | 0.50 | 2.0 |
| alpha-BHC | | 0.14 | U | 0.14 | 1.7 |
| beta-BHC | | 0.50 | U | 0.50 | 2.0 |
| Chlordane (technical) | | 2.4 | U | 2.4 | 17 |
| delta-BHC | | 0.50 | U | 0.50 | 2.0 |
| Dieldrin | | 0.15 | U | 0.15 | 1.7 |
| Endosulfan I | | 0.25 | U | 0.25 | 2.0 |
| Endosulfan II | | 0.25 | U | 0.25 | 3.3 |
| Endosulfan sulfate | | 0.25 | U | 0.25 | 3.3 |
| Endrin | | 0.50 | U | 0.50 | 4.0 |
| Endrin aldehyde | | 0.50 | U | 0.50 | 4.0 |
| Endrin ketone | | 0.50 | U | 0.50 | 4.0 |
| gamma-BHC (Lindane) | | 0.50 | U | 0.50 | 2.0 |
| Heptachlor | | 0.50 | U | 0.50 | 2.0 |
| Heptachlor epoxide | | 0.14 | U | 0.14 | 2.0 |
| Methoxychlor | | 1.0 | U | 1.0 | 17 |
| Toxaphene | | 29 | U | 29 | 170 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 66 | | 30 - 150 |
| Tetrachloro-m-xylene | 74 | | 30 - 150 |

**Client Sample ID:** **3A**

| | | |
|---|---|---|
| Lab Sample ID: 660-33886-3 | | Date Sampled: 02/16/2010 1300 |
| Client Matrix: Solid | | Date Received: 02/18/2010 0905 |

## 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91299 | Instrument ID: | BSGJ |
| Preparation: | 3550B | Prep Batch: 660-90901 | Initial Weight/Volume: | 29.80 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/25/2010 0443 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0654 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| 4,4'-DDD | | 0.50 | U | 0.50 | 3.3 |
| 4,4'-DDE | | 0.50 | U | 0.50 | 3.3 |
| 4,4'-DDT | | 0.50 | U | 0.50 | 3.3 |
| Aldrin | | 0.50 | U | 0.50 | 2.0 |
| alpha-BHC | | 0.14 | U | 0.14 | 1.7 |
| beta-BHC | | 0.50 | U | 0.50 | 2.0 |
| Chlordane (technical) | | 2.4 | U | 2.4 | 17 |
| delta-BHC | | 0.50 | U | 0.50 | 2.0 |
| Dieldrin | | 0.15 | U | 0.15 | 1.7 |
| Endosulfan I | | 0.25 | U | 0.25 | 2.0 |
| Endosulfan II | | 0.25 | U | 0.25 | 3.3 |
| Endosulfan sulfate | | 0.25 | U | 0.25 | 3.3 |
| Endrin | | 0.50 | U | 0.50 | 4.0 |
| Endrin aldehyde | | 0.50 | U | 0.50 | 4.0 |
| Endrin ketone | | 0.50 | U | 0.50 | 4.0 |
| gamma-BHC (Lindane) | | 0.50 | U | 0.50 | 2.0 |
| Heptachlor | | 0.50 | U | 0.50 | 2.0 |
| Heptachlor epoxide | | 0.14 | U | 0.14 | 2.0 |
| Methoxychlor | | 1.0 | U | 1.0 | 17 |
| Toxaphene | | 29 | U | 29 | 170 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 54 | | 30 - 150 |
| Tetrachloro-m-xylene | 65 | | 30 - 150 |

**Client Sample ID:** **4B**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33886-4 | Date Sampled: | 02/16/2010 1400 |
| Client Matrix: | Solid | Date Received: | 02/18/2010 0905 |

### 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91299 | Instrument ID: | BSGJ |
| Preparation: | 3550B | Prep Batch: 660-90901 | Initial Weight/Volume: | 29.85 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/25/2010 0456 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0654 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| 4,4'-DDD | | 0.50 | U | 0.50 | 3.3 |
| 4,4'-DDE | | 0.50 | U | 0.50 | 3.3 |
| 4,4'-DDT | | 0.50 | U | 0.50 | 3.3 |
| Aldrin | | 0.50 | U | 0.50 | 2.0 |
| alpha-BHC | | 0.14 | U | 0.14 | 1.7 |
| beta-BHC | | 0.50 | U | 0.50 | 2.0 |
| Chlordane (technical) | | 2.4 | U | 2.4 | 17 |
| delta-BHC | | 0.50 | U | 0.50 | 2.0 |
| Dieldrin | | 0.19 | I | 0.15 | 1.7 |
| Endosulfan I | | 0.25 | U | 0.25 | 2.0 |
| Endosulfan II | | 0.25 | U | 0.25 | 3.3 |
| Endosulfan sulfate | | 0.25 | U | 0.25 | 3.3 |
| Endrin | | 0.50 | U | 0.50 | 4.0 |
| Endrin ketone | | 0.50 | U | 0.50 | 4.0 |
| gamma-BHC (Lindane) | | 0.50 | U | 0.50 | 2.0 |
| Heptachlor | | 0.50 | U | 0.50 | 2.0 |
| Heptachlor epoxide | | 0.14 | U | 0.14 | 2.0 |
| Methoxychlor | | 1.0 | U | 1.0 | 17 |
| Toxaphene | | 29 | U | 29 | 170 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 48 | | 30 - 150 |
| Tetrachloro-m-xylene | 59 | | 30 - 150 |

**Client Sample ID:** **4B**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33886-4 | Date Sampled: | 02/16/2010 1400 |
| Client Matrix: | Solid | Date Received: | 02/18/2010 0905 |

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### 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91299 | Instrument ID: | BSGJ |
| Preparation: | 3550B | Prep Batch: 660-90901 | Initial Weight/Volume: | 29.85 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/25/2010 0510 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0654 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Endrin aldehyde | | 0.50 | U | 0.50 | 4.0 |

**Client Sample ID:** **SB**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33886-5 | Date Sampled: 02/16/2010 1530 |
| Client Matrix: | Water | Date Received: 02/18/2010 0905 |

### 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91104 | Instrument ID: | BSGJ |
| Preparation: | 3510C | Prep Batch: 660-90902 | Initial Weight/Volume: | 500 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 5 mL |
| Date Analyzed: | 02/23/2010 1546 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0737 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 4,4'-DDD | 0.0041 | U | 0.0041 | 0.010 |
| 4,4'-DDE | 0.0055 | U | 0.0055 | 0.010 |
| 4,4'-DDT | 0.0032 | U | 0.0032 | 0.010 |
| Aldrin | 0.0018 | U | 0.0018 | 0.010 |
| alpha-BHC | 0.0028 | U | 0.0028 | 0.010 |
| beta-BHC | 0.0027 | U | 0.0027 | 0.010 |
| Chlordane (technical) | 0.057 | U | 0.057 | 0.50 |
| delta-BHC | 0.0028 | U | 0.0028 | 0.010 |
| Dieldrin | 0.0014 | U | 0.0014 | 0.010 |
| Endosulfan I | 0.0034 | U | 0.0034 | 0.010 |
| Endosulfan II | 0.0033 | U | 0.0033 | 0.010 |
| Endosulfan sulfate | 0.0030 | U | 0.0030 | 0.010 |
| Endrin | 0.0031 | U | 0.0031 | 0.010 |
| Endrin aldehyde | 0.0032 | U | 0.0032 | 0.010 |
| Endrin ketone | 0.0054 | U | 0.0054 | 0.10 |
| gamma-BHC (Lindane) | 0.0026 | U | 0.0026 | 0.010 |
| Heptachlor | 0.0031 | U | 0.0031 | 0.010 |
| Heptachlor epoxide | 0.0031 | U | 0.0031 | 0.010 |
| Methoxychlor | 0.0051 | U | 0.0051 | 0.010 |
| Toxaphene | 0.72 | U | 0.72 | 3.0 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 46 | | 30 - 150 |
| Tetrachloro-m-xylene | 67 | | 30 - 150 |

# Analytical Data

Client: Environmental Engineering Consultant    Job Number: 660-33886-1

**Client Sample ID: 2A**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33886-6 | Date Sampled: 02/16/2010 1100 |
| Client Matrix: | Water | Date Received: 02/18/2010 0905 |

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## 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91104 | Instrument ID: | BSGJ |
| Preparation: | 3510C | Prep Batch: 660-90902 | Initial Weight/Volume: | 1020 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/23/2010 1559 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0737 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 4,4'-DDD | 0.0040 | U | 0.0040 | 0.0098 |
| 4,4'-DDE | 0.0054 | U | 0.0054 | 0.0098 |
| 4,4'-DDT | 0.0031 | U | 0.0031 | 0.0098 |
| Aldrin | 0.0018 | U | 0.0018 | 0.0098 |
| alpha-BHC | 0.0027 | U | 0.0027 | 0.0098 |
| beta-BHC | 0.0026 | U | 0.0026 | 0.0098 |
| Chlordane (technical) | 0.056 | U | 0.056 | 0.49 |
| delta-BHC | 0.0027 | U | 0.0027 | 0.0098 |
| Dieldrin | 0.035 | | 0.0014 | 0.0098 |
| Endosulfan I | 0.0034 | U | 0.0034 | 0.0098 |
| Endosulfan II | 0.0032 | U | 0.0032 | 0.0098 |
| Endosulfan sulfate | 0.0029 | U | 0.0029 | 0.0098 |
| Endrin | 0.0031 | U | 0.0031 | 0.0098 |
| Endrin aldehyde | 0.0031 | U | 0.0031 | 0.0098 |
| Endrin ketone | 0.0053 | U | 0.0053 | 0.098 |
| gamma-BHC (Lindane) | 0.0026 | U | 0.0026 | 0.0098 |
| Heptachlor | 0.0030 | U | 0.0030 | 0.0098 |
| Heptachlor epoxide | 0.0031 | U | 0.0031 | 0.0098 |
| Methoxychlor | 0.0050 | U | 0.0050 | 0.0098 |
| Toxaphene | 0.71 | U | 0.71 | 2.9 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 57 | | 30 - 150 |
| Tetrachloro-m-xylene | 71 | | 30 - 150 |

# Analytical Data

Client: Environmental Engineering Consultant                    Job Number: 660-33886-1

**Client Sample ID: 1**

Lab Sample ID: 660-33886-7                    Date Sampled: 02/16/2010 1000
Client Matrix: Water                    Date Received: 02/18/2010 0905

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## 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91104 | Instrument ID: | BSGJ |
| Preparation: | 3510C | Prep Batch: 660-90902 | Initial Weight/Volume: | 1040 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/23/2010 1613 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0737 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 4,4'-DDD | 0.0039 | U | 0.0039 | 0.0096 |
| 4,4'-DDE | 0.0053 | U | 0.0053 | 0.0096 |
| 4,4'-DDT | 0.0030 | U | 0.0030 | 0.0096 |
| Aldrin | 0.0018 | U | 0.0018 | 0.0096 |
| alpha-BHC | 0.0027 | U | 0.0027 | 0.0096 |
| beta-BHC | 0.0026 | U | 0.0026 | 0.0096 |
| Chlordane (technical) | 0.055 | U | 0.055 | 0.48 |
| delta-BHC | 0.0027 | U | 0.0027 | 0.0096 |
| Dieldrin | 0.0027 | I | 0.0013 | 0.0096 |
| Endosulfan I | 0.0033 | U | 0.0033 | 0.0096 |
| Endosulfan II | 0.0032 | U | 0.0032 | 0.0096 |
| Endosulfan sulfate | 0.0028 | U | 0.0028 | 0.0096 |
| Endrin | 0.0030 | U | 0.0030 | 0.0096 |
| Endrin aldehyde | 0.0031 | U | 0.0031 | 0.0096 |
| Endrin ketone | 0.0052 | U | 0.0052 | 0.096 |
| gamma-BHC (Lindane) | 0.0025 | U | 0.0025 | 0.0096 |
| Heptachlor | 0.0030 | U | 0.0030 | 0.0096 |
| Heptachlor epoxide | 0.0030 | U | 0.0030 | 0.0096 |
| Methoxychlor | 0.0049 | U | 0.0049 | 0.0096 |
| Toxaphene | 0.69 | U | 0.69 | 2.9 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 49 | | 30 - 150 |
| Tetrachloro-m-xylene | 70 | | 30 - 150 |

**Client Sample ID:** **3B**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33886-8 | Date Sampled: 02/16/2010 1220 |
| Client Matrix: | Water | Date Received: 02/18/2010 0905 |

## 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91104 | Instrument ID: | BSGJ |
| Preparation: | 3510C | Prep Batch: 660-90902 | Initial Weight/Volume: | 1040 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/23/2010 1626 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0737 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 4,4'-DDD | 0.0039 | U | 0.0039 | 0.0096 |
| 4,4'-DDE | 0.0053 | U | 0.0053 | 0.0096 |
| 4,4'-DDT | 0.0030 | U | 0.0030 | 0.0096 |
| Aldrin | 0.0018 | U | 0.0018 | 0.0096 |
| alpha-BHC | 0.0027 | U | 0.0027 | 0.0096 |
| beta-BHC | 0.0026 | U | 0.0026 | 0.0096 |
| Chlordane (technical) | 0.055 | U | 0.055 | 0.48 |
| delta-BHC | 0.0027 | U | 0.0027 | 0.0096 |
| Dieldrin | 0.0013 | U | 0.0013 | 0.0096 |
| Endosulfan I | 0.0033 | U | 0.0033 | 0.0096 |
| Endosulfan II | 0.0032 | U | 0.0032 | 0.0096 |
| Endosulfan sulfate | 0.0028 | U | 0.0028 | 0.0096 |
| Endrin | 0.0030 | U | 0.0030 | 0.0096 |
| Endrin aldehyde | 0.0031 | U | 0.0031 | 0.0096 |
| Endrin ketone | 0.0052 | U | 0.0052 | 0.096 |
| gamma-BHC (Lindane) | 0.0025 | U | 0.0025 | 0.0096 |
| Heptachlor | 0.0030 | U | 0.0030 | 0.0096 |
| Heptachlor epoxide | 0.0030 | U | 0.0030 | 0.0096 |
| Methoxychlor | 0.0049 | U | 0.0049 | 0.0096 |
| Toxaphene | 0.69 | U | 0.69 | 2.9 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 54 | | 30 - 150 |
| Tetrachloro-m-xylene | 67 | | 30 - 150 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Client Sample ID:** **3A**

Lab Sample ID: 660-33886-9

Client Matrix: Water

Date Sampled: 02/16/2010 1240

Date Received: 02/18/2010 0905

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## 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91104 | Instrument ID: | BSGJ |
| Preparation: | 3510C | Prep Batch: 660-90902 | Initial Weight/Volume: | 1040 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/23/2010 1640 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0737 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 4,4'-DDD | 0.0039 | U | 0.0039 | 0.0096 |
| 4,4'-DDE | 0.0053 | U | 0.0053 | 0.0096 |
| 4,4'-DDT | 0.0030 | U | 0.0030 | 0.0096 |
| Aldrin | 0.0018 | U | 0.0018 | 0.0096 |
| alpha-BHC | 0.0027 | U | 0.0027 | 0.0096 |
| beta-BHC | 0.0026 | U | 0.0026 | 0.0096 |
| Chlordane (technical) | 0.055 | U | 0.055 | 0.48 |
| delta-BHC | 0.0027 | U | 0.0027 | 0.0096 |
| Dieldrin | 0.0013 | U | 0.0013 | 0.0096 |
| Endosulfan I | 0.0033 | U | 0.0033 | 0.0096 |
| Endosulfan II | 0.0032 | U | 0.0032 | 0.0096 |
| Endosulfan sulfate | 0.0028 | U | 0.0028 | 0.0096 |
| Endrin | 0.0030 | U | 0.0030 | 0.0096 |
| Endrin aldehyde | 0.0031 | U | 0.0031 | 0.0096 |
| Endrin ketone | 0.0052 | U | 0.0052 | 0.096 |
| gamma-BHC (Lindane) | 0.0025 | U | 0.0025 | 0.0096 |
| Heptachlor | 0.0030 | U | 0.0030 | 0.0096 |
| Heptachlor epoxide | 0.0030 | U | 0.0030 | 0.0096 |
| Methoxychlor | 0.0049 | U | 0.0049 | 0.0096 |
| Toxaphene | 0.69 | U | 0.69 | 2.9 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 53 | | 30 - 150 |
| Tetrachloro-m-xylene | 69 | | 30 - 150 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Client Sample ID:** **4B**

Lab Sample ID: 660-33886-10
Client Matrix: Water

Date Sampled: 02/16/2010 1350
Date Received: 02/18/2010 0905

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## 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91104 | Instrument ID: | BSGJ |
| Preparation: | 3510C | Prep Batch: 660-90902 | Initial Weight/Volume: | 1050 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/23/2010 1653 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0737 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Endrin aldehyde | 0.0030 | U | 0.0030 | 0.0095 |

**Client Sample ID:** **4B**

Lab Sample ID: 660-33886-10
Client Matrix: Water

Date Sampled: 02/16/2010 1350
Date Received: 02/18/2010 0905

---

### 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91104 | Instrument ID: | BSGJ |
| Preparation: | 3510C | Prep Batch: 660-90902 | Initial Weight/Volume: | 1050 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/23/2010 1854 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0737 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 4,4'-DDD | 0.0039 | U | 0.0039 | 0.0095 |
| 4,4'-DDE | 0.0052 | U | 0.0052 | 0.0095 |
| 4,4'-DDT | 0.0030 | U | 0.0030 | 0.0095 |
| Aldrin | 0.0017 | U | 0.0017 | 0.0095 |
| alpha-BHC | 0.0027 | U | 0.0027 | 0.0095 |
| beta-BHC | 0.0025 | U | 0.0025 | 0.0095 |
| Chlordane (technical) | 0.054 | U | 0.054 | 0.48 |
| delta-BHC | 0.0026 | U | 0.0026 | 0.0095 |
| Dieldrin | 0.0013 | U | 0.0013 | 0.0095 |
| Endosulfan I | 0.0033 | U | 0.0033 | 0.0095 |
| Endosulfan II | 0.0031 | U | 0.0031 | 0.0095 |
| Endosulfan sulfate | 0.0028 | U | 0.0028 | 0.0095 |
| Endrin | 0.0030 | U | 0.0030 | 0.0095 |
| Endrin ketone | 0.0051 | U | 0.0051 | 0.095 |
| gamma-BHC (Lindane) | 0.0025 | U | 0.0025 | 0.0095 |
| Heptachlor | 0.0029 | U | 0.0029 | 0.0095 |
| Heptachlor epoxide | 0.0030 | U | 0.0030 | 0.0095 |
| Methoxychlor | 0.0048 | U | 0.0048 | 0.0095 |
| Toxaphene | 0.69 | U | 0.69 | 2.9 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 68 | | 30 - 150 |
| Tetrachloro-m-xylene | 64 | | 30 - 150 |

# Analytical Data

Client: Environmental Engineering Consultant | Job Number: 660-33886-1

**Client Sample ID: 5A**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33886-11 | Date Sampled: 02/16/2010 1330 |
| Client Matrix: | Water | Date Received: 02/18/2010 0905 |

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## 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91104 | Instrument ID: | BSGJ |
| Preparation: | 3510C | Prep Batch: 660-90902 | Initial Weight/Volume: | 950 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/23/2010 1707 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0737 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 4,4'-DDD | 0.0043 | U | 0.0043 | 0.011 |
| 4,4'-DDE | 0.0058 | U | 0.0058 | 0.011 |
| 4,4'-DDT | 0.0033 | U | 0.0033 | 0.011 |
| Aldrin | 0.0019 | U | 0.0019 | 0.011 |
| alpha-BHC | 0.0029 | U | 0.0029 | 0.011 |
| beta-BHC | 0.0028 | U | 0.0028 | 0.011 |
| Chlordane (technical) | 0.060 | U | 0.060 | 0.53 |
| delta-BHC | 0.0029 | U | 0.0029 | 0.011 |
| Dieldrin | 0.0034 | I | 0.0015 | 0.011 |
| Endosulfan I | 0.0036 | U | 0.0036 | 0.011 |
| Endosulfan II | 0.0035 | U | 0.0035 | 0.011 |
| Endosulfan sulfate | 0.0031 | U | 0.0031 | 0.011 |
| Endrin | 0.0033 | U | 0.0033 | 0.011 |
| Endrin aldehyde | 0.0034 | U | 0.0034 | 0.011 |
| Endrin ketone | 0.0057 | U | 0.0057 | 0.11 |
| gamma-BHC (Lindane) | 0.0027 | U | 0.0027 | 0.011 |
| Heptachlor | 0.0032 | U | 0.0032 | 0.011 |
| Heptachlor epoxide | 0.0033 | U | 0.0033 | 0.011 |
| Methoxychlor | 0.0053 | U | 0.0053 | 0.011 |
| Toxaphene | 0.76 | U | 0.76 | 3.2 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 50 | | 30 - 150 |
| Tetrachloro-m-xylene | 71 | | 30 - 150 |

**Client Sample ID:** **4D**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33886-12 | Date Sampled: 02/16/2010 1440 |
| Client Matrix: | Water | Date Received: 02/18/2010 0905 |

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### 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91104 | Instrument ID: | BSGJ |
| Preparation: | 3510C | Prep Batch: 660-90902 | Initial Weight/Volume: | 1050 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/23/2010 1720 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0737 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Endrin aldehyde | 0.0030 | U | 0.0030 | 0.0095 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Client Sample ID:** **4D**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33886-12 | Date Sampled: | 02/16/2010 1440 |
| Client Matrix: | Water | Date Received: | 02/18/2010 0905 |

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### 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91104 | Instrument ID: | BSGJ |
| Preparation: | 3510C | Prep Batch: 660-90902 | Initial Weight/Volume: | 1050 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/23/2010 1907 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0737 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 4,4'-DDD | 0.0039 | U | 0.0039 | 0.0095 |
| 4,4'-DDE | 0.0052 | U | 0.0052 | 0.0095 |
| 4,4'-DDT | 0.0030 | U | 0.0030 | 0.0095 |
| Aldrin | 0.0017 | U | 0.0017 | 0.0095 |
| alpha-BHC | 0.0027 | U | 0.0027 | 0.0095 |
| beta-BHC | 0.0025 | U | 0.0025 | 0.0095 |
| Chlordane (technical) | 0.054 | U | 0.054 | 0.48 |
| delta-BHC | 0.0026 | U | 0.0026 | 0.0095 |
| Dieldrin | 0.0013 | U | 0.0013 | 0.0095 |
| Endosulfan I | 0.0033 | U | 0.0033 | 0.0095 |
| Endosulfan II | 0.0031 | U | 0.0031 | 0.0095 |
| Endosulfan sulfate | 0.0028 | U | 0.0028 | 0.0095 |
| Endrin | 0.0030 | U | 0.0030 | 0.0095 |
| Endrin ketone | 0.0051 | U | 0.0051 | 0.095 |
| gamma-BHC (Lindane) | 0.0025 | U | 0.0025 | 0.0095 |
| Heptachlor | 0.0029 | U | 0.0029 | 0.0095 |
| Heptachlor epoxide | 0.0030 | U | 0.0030 | 0.0095 |
| Methoxychlor | 0.0048 | U | 0.0048 | 0.0095 |
| Toxaphene | 0.69 | U | 0.69 | 2.9 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 94 | | 30 - 150 |
| Tetrachloro-m-xylene | 63 | | 30 - 150 |

# Analytical Data

Client: Environmental Engineering Consultant Job Number: 660-33886-1

**Client Sample ID: 2A**

Lab Sample ID: 660-33886-1 Date Sampled: 02/16/2010 1110
Client Matrix: Solid Date Received: 02/18/2010 0905

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## 8141A Organophosphorous Pesticides (GC)

| | | | | | |
|---|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-65935 | | Instrument ID: | SGF |
| Preparation: | 3550B | Prep Batch: 640-65855 | | Initial Weight/Volume: | 00030.42 g |
| Dilution: | 1.0 | | | Final Weight/Volume: | 10.0 mL |
| Date Analyzed: | 02/24/2010 1657 | | | Injection Volume: | 1 uL |
| Date Prepared: | 02/22/2010 1006 | | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Azinphos-methyl | | 4.3 | U | 4.3 | 65 |
| Bolstar | | 8.4 | U | 8.4 | 33 |
| Chlorpyrifos | | 8.3 | U | 8.3 | 33 |
| Coumaphos | | 8.5 | U | 8.5 | 330 |
| Demeton, Total | | 13 | U | 13 | 82 |
| Diazinon | | 8.7 | U | 8.7 | 33 |
| Dichlorvos | | 17 | U | 17 | 65 |
| Dimethoate | | 9.9 | U | 9.9 | 65 |
| Disulfoton | | 11 | U | 11 | 65 |
| EPN | | 9.0 | U | 9.0 | 33 |
| Ethoprop | | 15 | U | 15 | 17 |
| Ethyl Parathion | | 8.7 | U | 8.7 | 33 |
| Fensulfothion | | 9.9 | U | 9.9 | 330 |
| Hexazinone | | 7.6 | U | 7.6 | 33 |
| Malathion | | 8.9 | U | 8.9 | 33 |
| Merphos | | 8.2 | U | 8.2 | 33 |
| Methyl parathion | | 5.3 | U | 5.3 | 17 |
| Mevinphos | | 11 | U | 11 | 65 |
| Monochrotophos | | 84 | U | 84 | 330 |
| Naled | | 5.1 | U | 5.1 | 330 |
| Phorate | | 11 | U | 11 | 33 |
| Ronnel | | 7.9 | U | 7.9 | 33 |
| Stirophos | | 8.8 | U | 8.8 | 33 |
| Sulfotepp | | 5.2 | U | 5.2 | 17 |
| Tokuthion | | 7.6 | U | 7.6 | 33 |
| Trichloronate | | 8.1 | U | 8.1 | 330 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 63 | | 35 - 134 |

**Client Sample ID:** **1**

Lab Sample ID: 660-33886-2
Client Matrix: Solid

Date Sampled: 02/16/2010 1010
Date Received: 02/18/2010 0905

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### 8141A Organophosphorous Pesticides (GC)

| | | | | | |
|---|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-65935 | | Instrument ID: | SGF |
| Preparation: | 3550B | Prep Batch: 640-65855 | | Initial Weight/Volume: | 00030.17 g |
| Dilution: | 1.0 | | | Final Weight/Volume: | 10.0 mL |
| Date Analyzed: | 02/24/2010 1711 | | | Injection Volume: | 1 uL |
| Date Prepared: | 02/22/2010 1006 | | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Azinphos-methyl | | 4.4 | U | 4.4 | 66 |
| Bolstar | | 8.5 | U | 8.5 | 33 |
| Chlorpyrifos | | 8.4 | U | 8.4 | 33 |
| Coumaphos | | 8.6 | U | 8.6 | 330 |
| Demeton, Total | | 13 | U | 13 | 83 |
| Diazinon | | 8.8 | U | 8.8 | 33 |
| Dichlorvos | | 17 | U | 17 | 66 |
| Dimethoate | | 9.9 | U | 9.9 | 66 |
| Disulfoton | | 11 | U | 11 | 66 |
| EPN | | 9.0 | U | 9.0 | 33 |
| Ethoprop | | 15 | U | 15 | 17 |
| Ethyl Parathion | | 8.8 | U | 8.8 | 33 |
| Fensulfothion | | 9.9 | U | 9.9 | 330 |
| Hexazinone | | 7.7 | U | 7.7 | 33 |
| Malathion | | 8.9 | U | 8.9 | 33 |
| Merphos | | 8.3 | U | 8.3 | 33 |
| Methyl parathion | | 5.4 | U | 5.4 | 17 |
| Mevinphos | | 11 | U | 11 | 66 |
| Monochrotophos | | 85 | U | 85 | 330 |
| Naled | | 5.2 | U | 5.2 | 330 |
| Phorate | | 11 | U | 11 | 33 |
| Ronnel | | 8.0 | U | 8.0 | 33 |
| Stirophos | | 8.8 | U | 8.8 | 33 |
| Sulfotepp | | 5.3 | U | 5.3 | 17 |
| Tokuthion | | 7.7 | U | 7.7 | 33 |
| Trichloronate | | 8.2 | U | 8.2 | 330 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 67 | | 35 - 134 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Client Sample ID: 3A**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33886-3 | Date Sampled: | 02/16/2010 1300 |
| Client Matrix: | Solid | Date Received: | 02/18/2010 0905 |

## 8141A Organophosphorous Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-65935 | Instrument ID: | SGF |
| Preparation: | 3550B | Prep Batch: 640-65855 | Initial Weight/Volume: | 00030.11 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10.0 mL |
| Date Analyzed: | 02/24/2010 1740 | | Injection Volume: | 1 uL |
| Date Prepared: | 02/22/2010 1006 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Azinphos-methyl | | 4.4 | U | 4.4 | 66 |
| Bolstar | | 8.5 | U | 8.5 | 33 |
| Chlorpyrifos | | 8.4 | U | 8.4 | 33 |
| Coumaphos | | 8.6 | U | 8.6 | 330 |
| Demeton, Total | | 13 | U | 13 | 83 |
| Diazinon | | 8.8 | U | 8.8 | 33 |
| Dichlorvos | | 17 | U | 17 | 66 |
| Dimethoate | | 10 | U | 10 | 66 |
| Disulfoton | | 11 | U | 11 | 66 |
| EPN | | 9.1 | U | 9.1 | 33 |
| Ethoprop | | 15 | U | 15 | 17 |
| Ethyl Parathion | | 8.8 | U | 8.8 | 33 |
| Fensulfothion | | 10 | U | 10 | 330 |
| Hexazinone | | 7.7 | U | 7.7 | 33 |
| Malathion | | 9.0 | U | 9.0 | 33 |
| Merphos | | 8.3 | U | 8.3 | 33 |
| Methyl parathion | | 5.4 | U | 5.4 | 17 |
| Mevinphos | | 11 | U | 11 | 66 |
| Monochrotophos | | 85 | U | 85 | 330 |
| Naled | | 5.2 | U | 5.2 | 330 |
| Phorate | | 11 | U | 11 | 33 |
| Ronnel | | 8.0 | U | 8.0 | 33 |
| Stirophos | | 8.9 | U | 8.9 | 33 |
| Sulfotepp | | 5.3 | U | 5.3 | 17 |
| Tokuthion | | 7.7 | U | 7.7 | 33 |
| Trichloronate | | 8.2 | U | 8.2 | 330 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 67 | | 35 - 134 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Client Sample ID:** **4B**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33886-4 | Date Sampled: | 02/16/2010 1400 |
| Client Matrix: | Solid | Date Received: | 02/18/2010 0905 |

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### 8141A Organophosphorous Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-65935 | Instrument ID: | SGF |
| Preparation: | 3550B | Prep Batch: 640-65855 | Initial Weight/Volume: | 00030.49 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10.0 mL |
| Date Analyzed: | 02/24/2010 1754 | | Injection Volume: | 1 uL |
| Date Prepared: | 02/22/2010 1006 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Azinphos-methyl | | 4.3 | U | 4.3 | 65 |
| Bolstar | | 8.4 | U | 8.4 | 32 |
| Chlorpyrifos | | 8.3 | U | 8.3 | 32 |
| Coumaphos | | 8.5 | U | 8.5 | 320 |
| Demeton, Total | | 13 | U | 13 | 82 |
| Diazinon | | 8.7 | U | 8.7 | 32 |
| Dichlorvos | | 17 | U | 17 | 65 |
| Dimethoate | | 9.8 | U | 9.8 | 65 |
| Disulfoton | | 11 | U | 11 | 65 |
| EPN | | 9.0 | U | 9.0 | 32 |
| Ethoprop | | 15 | U | 15 | 17 |
| Ethyl Parathion | | 8.7 | U | 8.7 | 32 |
| Fensulfothion | | 9.8 | U | 9.8 | 320 |
| Hexazinone | | 7.6 | U | 7.6 | 32 |
| Malathion | | 8.9 | U | 8.9 | 32 |
| Merphos | | 8.2 | U | 8.2 | 32 |
| Methyl parathion | | 5.3 | U | 5.3 | 17 |
| Mevinphos | | 11 | U | 11 | 65 |
| Monochrotophos | | 84 | U | 84 | 320 |
| Naled | | 5.1 | U | 5.1 | 320 |
| Phorate | | 11 | U | 11 | 32 |
| Ronnel | | 7.9 | U | 7.9 | 32 |
| Stirophos | | 8.8 | U | 8.8 | 32 |
| Sulfotepp | | 5.2 | U | 5.2 | 17 |
| Tokuthion | | 7.6 | U | 7.6 | 32 |
| Trichloronate | | 8.1 | U | 8.1 | 320 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 67 | | 35 - 134 |

**Client Sample ID: SB**

Lab Sample ID: 660-33886-5
Client Matrix: Water

Date Sampled: 02/16/2010 1530
Date Received: 02/18/2010 0905

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## 8141A Organophosphorous Pesticides (GC)

| | | | | | |
|---|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-65935 | | Instrument ID: | SGF |
| Preparation: | 3520C | Prep Batch: 640-65814 | | Initial Weight/Volume: | 1060 mL |
| Dilution: | 1.0 | | | Final Weight/Volume: | 5.0 mL |
| Date Analyzed: | 02/23/2010 2020 | | | Injection Volume: | 1 uL |
| Date Prepared: | 02/19/2010 1415 | | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Azinphos-methyl | 0.31 | U | 0.31 | 0.94 |
| Bolstar | 0.090 | U | 0.090 | 0.94 |
| Chlorpyrifos | 0.10 | U | 0.10 | 0.94 |
| Coumaphos | 0.076 | U | 0.076 | 0.94 |
| Demeton, Total | 0.14 | U | 0.14 | 2.4 |
| Diazinon | 0.10 | U | 0.10 | 0.94 |
| Dichlorvos | 0.25 | U | 0.25 | 1.9 |
| Hexazinone | 0.15 | U | 0.15 | 1.9 |
| Dimethoate | 0.30 | U | 0.30 | 1.9 |
| Disulfoton | 0.11 | U | 0.11 | 1.9 |
| EPN | 0.067 | U | 0.067 | 0.94 |
| Ethoprop | 0.39 | U | 0.39 | 0.47 |
| Fensulfothion | 0.16 | U | 0.16 | 4.7 |
| Malathion | 0.087 | U | 0.087 | 0.94 |
| Merphos | 0.12 | U | 0.12 | 0.94 |
| Mevinphos | 0.14 | U | 0.14 | 1.9 |
| Monochrotophos | 2.5 | U J3 | 2.5 | 9.4 |
| Naled | 0.34 | U | 0.34 | 4.7 |
| Ethyl Parathion | 0.075 | U | 0.075 | 0.94 |
| Methyl parathion | 0.11 | U | 0.11 | 0.47 |
| Phorate | 0.15 | U | 0.15 | 0.94 |
| Ronnel | 0.12 | U | 0.12 | 0.94 |
| Sulfotepp | 0.052 | U | 0.052 | 0.47 |
| Stirophos | 0.079 | U | 0.079 | 0.94 |
| Tokuthion | 0.082 | U | 0.082 | 0.94 |
| Trichloronate | 0.10 | U | 0.10 | 0.94 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 106 | | 37 - 139 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Client Sample ID:** **2A**

Lab Sample ID: 660-33886-6
Client Matrix: Water

Date Sampled: 02/16/2010 1100
Date Received: 02/18/2010 0905

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### 8141A Organophosphorous Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-65935 | Instrument ID: | SGF |
| Preparation: | 3520C | Prep Batch: 640-65814 | Initial Weight/Volume: | 1040 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 5.0 mL |
| Date Analyzed: | 02/23/2010 2256 | | Injection Volume: | 1 uL |
| Date Prepared: | 02/19/2010 1415 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Azinphos-methyl | 0.32 | U | 0.32 | 0.96 |
| Bolstar | 0.091 | U | 0.091 | 0.96 |
| Chlorpyrifos | 0.11 | U | 0.11 | 0.96 |
| Coumaphos | 0.078 | U | 0.078 | 0.96 |
| Demeton, Total | 0.14 | U | 0.14 | 2.4 |
| Diazinon | 0.11 | U | 0.11 | 0.96 |
| Dichlorvos | 0.25 | U | 0.25 | 1.9 |
| Hexazinone | 0.15 | U | 0.15 | 1.9 |
| Dimethoate | 0.31 | U | 0.31 | 1.9 |
| Disulfoton | 0.12 | U | 0.12 | 1.9 |
| EPN | 0.068 | U | 0.068 | 0.96 |
| Ethoprop | 0.39 | U | 0.39 | 0.48 |
| Fensulfothion | 0.16 | U | 0.16 | 4.8 |
| Malathion | 0.088 | U | 0.088 | 0.96 |
| Merphos | 0.12 | U | 0.12 | 0.96 |
| Mevinphos | 0.14 | U | 0.14 | 1.9 |
| Monochrotophos | 2.5 | U J3 | 2.5 | 9.6 |
| Naled | 0.35 | U | 0.35 | 4.8 |
| Ethyl Parathion | 0.077 | U | 0.077 | 0.96 |
| Methyl parathion | 0.12 | U | 0.12 | 0.48 |
| Phorate | 0.15 | U | 0.15 | 0.96 |
| Ronnel | 0.12 | U | 0.12 | 0.96 |
| Sulfotepp | 0.053 | U | 0.053 | 0.48 |
| Stirophos | 0.081 | U | 0.081 | 0.96 |
| Tokuthion | 0.084 | U | 0.084 | 0.96 |
| Trichloronate | 0.11 | U | 0.11 | 0.96 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 99 | | 37 - 139 |

**Client Sample ID:** **1**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33886-7 | Date Sampled: 02/16/2010 1000 |
| Client Matrix: | Water | Date Received: 02/18/2010 0905 |

### 8141A Organophosphorous Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-65935 | Instrument ID: | SGF |
| Preparation: | 3520C | Prep Batch: 640-65814 | Initial Weight/Volume: | 1000 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 5.0 mL |
| Date Analyzed: | 02/23/2010 2310 | | Injection Volume: | 1 uL |
| Date Prepared: | 02/19/2010 1415 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Azinphos-methyl | 0.33 | U | 0.33 | 1.0 |
| Bolstar | 0.095 | U | 0.095 | 1.0 |
| Chlorpyrifos | 0.11 | U | 0.11 | 1.0 |
| Coumaphos | 0.081 | U | 0.081 | 1.0 |
| Demeton, Total | 0.15 | U | 0.15 | 2.5 |
| Diazinon | 0.11 | U | 0.11 | 1.0 |
| Dichlorvos | 0.26 | U | 0.26 | 2.0 |
| Hexazinone | 0.16 | U | 0.16 | 2.0 |
| Dimethoate | 0.32 | U | 0.32 | 2.0 |
| Disulfoton | 0.12 | U | 0.12 | 2.0 |
| EPN | 0.071 | U | 0.071 | 1.0 |
| Ethoprop | 0.41 | U | 0.41 | 0.50 |
| Fensulfothion | 0.17 | U | 0.17 | 5.0 |
| Malathion | 0.092 | U | 0.092 | 1.0 |
| Merphos | 0.13 | U | 0.13 | 1.0 |
| Mevinphos | 0.15 | U | 0.15 | 2.0 |
| Monochrotophos | 2.6 | U J3 | 2.6 | 10 |
| Naled | 0.36 | U | 0.36 | 5.0 |
| Ethyl Parathion | 0.080 | U | 0.080 | 1.0 |
| Methyl parathion | 0.12 | U | 0.12 | 0.50 |
| Phorate | 0.16 | U | 0.16 | 1.0 |
| Ronnel | 0.13 | U | 0.13 | 1.0 |
| Sulfotepp | 0.055 | U | 0.055 | 0.50 |
| Stirophos | 0.084 | U | 0.084 | 1.0 |
| Tokuthion | 0.087 | U | 0.087 | 1.0 |
| Trichloronate | 0.11 | U | 0.11 | 1.0 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 99 | | 37 - 139 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Client Sample ID: 3B**

Lab Sample ID: 660-33886-8
Client Matrix: Water

Date Sampled: 02/16/2010 1220
Date Received: 02/18/2010 0905

---

## 8141A Organophosphorous Pesticides (GC)

Method: 8141A
Preparation: 3520C
Dilution: 1.0
Date Analyzed: 02/23/2010 2034
Date Prepared: 02/19/2010 1415

Analysis Batch: 640-65935
Prep Batch: 640-65814

Instrument ID: SGF
Initial Weight/Volume: 1040 mL
Final Weight/Volume: 5.0 mL
Injection Volume: 1 uL
Result Type: PRIMARY

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Azinphos-methyl | 0.32 | U | 0.32 | 0.96 |
| Bolstar | 0.091 | U | 0.091 | 0.96 |
| Chlorpyrifos | 0.11 | U | 0.11 | 0.96 |
| Coumaphos | 0.078 | U | 0.078 | 0.96 |
| Demeton, Total | 0.14 | U | 0.14 | 2.4 |
| Diazinon | 0.11 | U | 0.11 | 0.96 |
| Dichlorvos | 0.25 | U | 0.25 | 1.9 |
| Hexazinone | 0.15 | U | 0.15 | 1.9 |
| Dimethoate | 0.31 | U | 0.31 | 1.9 |
| Disulfoton | 0.12 | U | 0.12 | 1.9 |
| EPN | 0.068 | U | 0.068 | 0.96 |
| Ethoprop | 0.39 | U | 0.39 | 0.48 |
| Fensulfothion | 0.16 | U | 0.16 | 4.8 |
| Malathion | 0.088 | U | 0.088 | 0.96 |
| Merphos | 0.12 | U | 0.12 | 0.96 |
| Mevinphos | 0.14 | U | 0.14 | 1.9 |
| Monochrotophos | 2.5 | U J3 | 2.5 | 9.6 |
| Naled | 0.35 | U | 0.35 | 4.8 |
| Ethyl Parathion | 0.077 | U | 0.077 | 0.96 |
| Methyl parathion | 0.12 | U | 0.12 | 0.48 |
| Phorate | 0.15 | U | 0.15 | 0.96 |
| Ronnel | 0.12 | U | 0.12 | 0.96 |
| Sulfotepp | 0.053 | U | 0.053 | 0.48 |
| Stirophos | 0.081 | U | 0.081 | 0.96 |
| Tokuthion | 0.084 | U | 0.084 | 0.96 |
| Trichloronate | 0.11 | U | 0.11 | 0.96 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 88 | | 37 - 139 |

**Client Sample ID:** **3A**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33886-9 | Date Sampled: | 02/16/2010 1240 |
| Client Matrix: | Water | Date Received: | 02/18/2010 0905 |

### 8141A Organophosphorous Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-65935 | Instrument ID: | SGF |
| Preparation: | 3520C | Prep Batch: 640-65814 | Initial Weight/Volume: | 1040 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 5.0 mL |
| Date Analyzed: | 02/23/2010 1923 | | Injection Volume: | 1 uL |
| Date Prepared: | 02/19/2010 1415 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Azinphos-methyl | 0.32 | U | 0.32 | 0.96 |
| Bolstar | 0.091 | U | 0.091 | 0.96 |
| Chlorpyrifos | 0.11 | U | 0.11 | 0.96 |
| Coumaphos | 0.078 | U | 0.078 | 0.96 |
| Demeton, Total | 0.14 | U | 0.14 | 2.4 |
| Diazinon | 0.11 | U | 0.11 | 0.96 |
| Dichlorvos | 0.25 | U | 0.25 | 1.9 |
| Hexazinone | 0.15 | U | 0.15 | 1.9 |
| Dimethoate | 0.31 | U | 0.31 | 1.9 |
| Disulfoton | 0.12 | U | 0.12 | 1.9 |
| EPN | 0.068 | U | 0.068 | 0.96 |
| Ethoprop | 0.39 | U | 0.39 | 0.48 |
| Fensulfothion | 0.16 | U | 0.16 | 4.8 |
| Malathion | 0.088 | U | 0.088 | 0.96 |
| Merphos | 0.12 | U | 0.12 | 0.96 |
| Mevinphos | 0.14 | U | 0.14 | 1.9 |
| Monochrotophos | 2.5 | U J3 | 2.5 | 9.6 |
| Naled | 0.35 | U | 0.35 | 4.8 |
| Ethyl Parathion | 0.077 | U | 0.077 | 0.96 |
| Methyl parathion | 0.12 | U | 0.12 | 0.48 |
| Phorate | 0.15 | U | 0.15 | 0.96 |
| Ronnel | 0.12 | U | 0.12 | 0.96 |
| Sulfotepp | 0.053 | U | 0.053 | 0.48 |
| Stirophos | 0.081 | U | 0.081 | 0.96 |
| Tokuthion | 0.084 | U | 0.084 | 0.96 |
| Trichloronate | 0.11 | U | 0.11 | 0.96 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 87 | | 37 - 139 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Client Sample ID: 4B**

Lab Sample ID: 660-33886-10
Client Matrix: Water

Date Sampled: 02/16/2010 1350
Date Received: 02/18/2010 0905

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## 8141A Organophosphorous Pesticides (GC)

Method: 8141A
Preparation: 3520C
Dilution: 1.0
Date Analyzed: 02/23/2010 1937
Date Prepared: 02/19/2010 1415

Analysis Batch: 640-65935
Prep Batch: 640-65814

Instrument ID: SGF
Initial Weight/Volume: 1060 mL
Final Weight/Volume: 5.0 mL
Injection Volume: 1 uL
Result Type: PRIMARY

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Azinphos-methyl | 0.31 | U | 0.31 | 0.94 |
| Bolstar | 0.090 | U | 0.090 | 0.94 |
| Chlorpyrifos | 0.10 | U | 0.10 | 0.94 |
| Coumaphos | 0.076 | U | 0.076 | 0.94 |
| Demeton, Total | 0.14 | U | 0.14 | 2.4 |
| Diazinon | 0.10 | U | 0.10 | 0.94 |
| Dichlorvos | 0.25 | U | 0.25 | 1.9 |
| Hexazinone | 0.15 | U | 0.15 | 1.9 |
| Dimethoate | 0.30 | U | 0.30 | 1.9 |
| Disulfoton | 0.11 | U | 0.11 | 1.9 |
| EPN | 0.067 | U | 0.067 | 0.94 |
| Ethoprop | 0.39 | U | 0.39 | 0.47 |
| Fensulfothion | 0.16 | U | 0.16 | 4.7 |
| Malathion | 0.087 | U | 0.087 | 0.94 |
| Merphos | 0.12 | U | 0.12 | 0.94 |
| Mevinphos | 0.14 | U | 0.14 | 1.9 |
| Monochrotophos | 2.5 | U J3 | 2.5 | 9.4 |
| Naled | 0.34 | U | 0.34 | 4.7 |
| Ethyl Parathion | 0.075 | U | 0.075 | 0.94 |
| Methyl parathion | 0.11 | U | 0.11 | 0.47 |
| Phorate | 0.15 | U | 0.15 | 0.94 |
| Ronnel | 0.12 | U | 0.12 | 0.94 |
| Sulfotepp | 0.052 | U | 0.052 | 0.47 |
| Stirophos | 0.079 | U | 0.079 | 0.94 |
| Tokuthion | 0.082 | U | 0.082 | 0.94 |
| Trichloronate | 0.10 | U | 0.10 | 0.94 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 90 |  | 37 - 139 |

**Client Sample ID:** **5A**

Lab Sample ID: 660-33886-11
Client Matrix: Water

Date Sampled: 02/16/2010 1330
Date Received: 02/18/2010 0905

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### 8141A Organophosphorous Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-65935 | Instrument ID: | SGF |
| Preparation: | 3520C | Prep Batch: 640-65814 | Initial Weight/Volume: | 1000 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 5.0 mL |
| Date Analyzed: | 02/23/2010 1951 | | Injection Volume: | 1 uL |
| Date Prepared: | 02/19/2010 1415 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Azinphos-methyl | 0.33 | U | 0.33 | 1.0 |
| Bolstar | 0.095 | U | 0.095 | 1.0 |
| Chlorpyrifos | 0.11 | U | 0.11 | 1.0 |
| Coumaphos | 0.081 | U | 0.081 | 1.0 |
| Demeton, Total | 0.15 | U | 0.15 | 2.5 |
| Diazinon | 0.11 | U | 0.11 | 1.0 |
| Dichlorvos | 0.26 | U | 0.26 | 2.0 |
| Hexazinone | 0.16 | U | 0.16 | 2.0 |
| Dimethoate | 0.32 | U | 0.32 | 2.0 |
| Disulfoton | 0.12 | U | 0.12 | 2.0 |
| EPN | 0.071 | U | 0.071 | 1.0 |
| Ethoprop | 0.41 | U | 0.41 | 0.50 |
| Fensulfothion | 0.17 | U | 0.17 | 5.0 |
| Malathion | 0.092 | U | 0.092 | 1.0 |
| Merphos | 0.13 | U | 0.13 | 1.0 |
| Mevinphos | 0.15 | U | 0.15 | 2.0 |
| Monochrotophos | 2.6 | U J3 | 2.6 | 10 |
| Naled | 0.36 | U | 0.36 | 5.0 |
| Ethyl Parathion | 0.080 | U | 0.080 | 1.0 |
| Methyl parathion | 0.12 | U | 0.12 | 0.50 |
| Phorate | 0.16 | U | 0.16 | 1.0 |
| Ronnel | 0.13 | U | 0.13 | 1.0 |
| Sulfotepp | 0.055 | U | 0.055 | 0.50 |
| Stirophos | 0.084 | U | 0.084 | 1.0 |
| Tokuthion | 0.087 | U | 0.087 | 1.0 |
| Trichloronate | 0.11 | U | 0.11 | 1.0 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 96 | | 37 - 139 |

**Client Sample ID:** **4D**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33886-12 | Date Sampled: 02/16/2010 1440 |
| Client Matrix: | Water | Date Received: 02/18/2010 0905 |

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## 8141A Organophosphorous Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-65935 | Instrument ID: | SGF |
| Preparation: | 3520C | Prep Batch: 640-65814 | Initial Weight/Volume: | 1060 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 5.0 mL |
| Date Analyzed: | 02/23/2010 2005 | | Injection Volume: | 1 uL |
| Date Prepared: | 02/19/2010 1415 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Azinphos-methyl | 0.31 | U | 0.31 | 0.94 |
| Bolstar | 0.090 | U | 0.090 | 0.94 |
| Chlorpyrifos | 0.10 | U | 0.10 | 0.94 |
| Coumaphos | 0.076 | U | 0.076 | 0.94 |
| Demeton, Total | 0.14 | U | 0.14 | 2.4 |
| Diazinon | 0.10 | U | 0.10 | 0.94 |
| Dichlorvos | 0.25 | U | 0.25 | 1.9 |
| Hexazinone | 0.15 | U | 0.15 | 1.9 |
| Dimethoate | 0.30 | U | 0.30 | 1.9 |
| Disulfoton | 0.11 | U | 0.11 | 1.9 |
| EPN | 0.067 | U | 0.067 | 0.94 |
| Ethoprop | 0.39 | U | 0.39 | 0.47 |
| Fensulfothion | 0.16 | U | 0.16 | 4.7 |
| Malathion | 0.087 | U | 0.087 | 0.94 |
| Merphos | 0.12 | U | 0.12 | 0.94 |
| Mevinphos | 0.14 | U | 0.14 | 1.9 |
| Monochrotophos | 2.5 | U J3 | 2.5 | 9.4 |
| Naled | 0.34 | U | 0.34 | 4.7 |
| Ethyl Parathion | 0.075 | U | 0.075 | 0.94 |
| Methyl parathion | 0.11 | U | 0.11 | 0.47 |
| Phorate | 0.15 | U | 0.15 | 0.94 |
| Ronnel | 0.12 | U | 0.12 | 0.94 |
| Sulfotepp | 0.052 | U | 0.052 | 0.47 |
| Stirophos | 0.079 | U | 0.079 | 0.94 |
| Tokuthion | 0.082 | U | 0.082 | 0.94 |
| Trichloronate | 0.10 | U | 0.10 | 0.94 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 92 | | 37 - 139 |

**Client Sample ID:** **2A**

|  |  |  |
|---|---|---|
| Lab Sample ID: | 660-33886-1 | Date Sampled: 02/16/2010 1110 |
| Client Matrix: | Solid | Date Received: 02/18/2010 0905 |

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### 8151A Herbicides (GC)

|  |  |  |  |  |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91563 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-91293 | Initial Weight/Volume: | 29.52 g |
| Dilution: | 1.0 |  | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 03/08/2010 2030 |  | Injection Volume: | 2 uL |
| Date Prepared: | 03/02/2010 1410 |  | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| 2,4,5-T |  | 10 | U | 10 | 51 |
| 2,4-D |  | 1.6 | U | 1.6 | 8.4 |
| 2,4-DB |  | 6.5 | U | 6.5 | 8.4 |
| Dalapon |  | 23 | U | 23 | 2000 |
| Dicamba |  | 12 | U | 12 | 51 |
| Dichlorprop |  | 25 | U | 25 | 100 |
| Dinoseb |  | 8.4 | U J3 | 8.4 | 30 |
| MCPA |  | 750 | U | 750 | 2000 |
| MCPP |  | 410 | U | 410 | 2000 |
| Pentachlorophenol |  | 5.1 | U | 5.1 | 17 |
| Picloram |  | 1.2 | U | 1.2 | 3.4 |
| Silvex (2,4,5-TP) |  | 10 | U | 10 | 51 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 42 |  | 10 - 135 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Client Sample ID: 1**

Lab Sample ID: 660-33886-2

Client Matrix: Solid

Date Sampled: 02/16/2010 1010

Date Received: 02/18/2010 0905

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### 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91563 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-91293 | Initial Weight/Volume: | 29.99 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 03/08/2010 2047 | | Injection Volume: | 2 uL |
| Date Prepared: | 03/02/2010 1410 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| 2,4,5-T | | 10 | U | 10 | 50 |
| 2,4-D | | 1.6 | U | 1.6 | 8.3 |
| 2,4-DB | | 6.4 | U | 6.4 | 8.3 |
| Dalapon | | 23 | U | 23 | 2000 |
| Dicamba | | 12 | U | 12 | 50 |
| Dichlorprop | | 25 | U | 25 | 100 |
| Dinoseb | | 8.3 | U J3 | 8.3 | 30 |
| MCPA | | 740 | U | 740 | 2000 |
| MCPP | | 400 | U | 400 | 2000 |
| Pentachlorophenol | | 5.0 | U | 5.0 | 17 |
| Picloram | | 1.2 | U | 1.2 | 3.3 |
| Silvex (2,4,5-TP) | | 10 | U | 10 | 50 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 55 | | 10 - 135 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Client Sample ID:** **3A**

Lab Sample ID: 660-33886-3

Client Matrix: Solid

Date Sampled: 02/16/2010 1300

Date Received: 02/18/2010 0905

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## 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91563 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-91293 | Initial Weight/Volume: | 30.40 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 03/07/2010 1812 | | Injection Volume: | 2 uL |
| Date Prepared: | 03/02/2010 1410 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| 2,4,5-T | | 9.9 | U | 9.9 | 49 |
| 2,4-D | | 1.6 | U | 1.6 | 8.2 |
| 2,4-DB | | 6.3 | U | 6.3 | 8.2 |
| Dalapon | | 23 | U | 23 | 2000 |
| Dicamba | | 12 | U | 12 | 49 |
| Dichlorprop | | 25 | U | 25 | 99 |
| Dinoseb | | 8.2 | U J3 | 8.2 | 30 |
| MCPA | | 730 | U | 730 | 2000 |
| MCPP | | 390 | U | 390 | 2000 |
| Pentachlorophenol | | 4.9 | U | 4.9 | 17 |
| Picloram | | 1.2 | U | 1.2 | 3.3 |
| Silvex (2,4,5-TP) | | 9.9 | U | 9.9 | 49 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 87 | | 10 - 135 |

**Client Sample ID: 4B**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33886-4 | Date Sampled: | 02/16/2010 1400 |
| Client Matrix: | Solid | Date Received: | 02/18/2010 0905 |

### 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91563 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-91293 | Initial Weight/Volume: | 30.08 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 03/08/2010 2105 | | Injection Volume: | 2 uL |
| Date Prepared: | 03/02/2010 1410 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| 2,4,5-T | | 10 | U | 10 | 50 |
| 2,4-D | | 1.6 | U | 1.6 | 8.3 |
| 2,4-DB | | 6.4 | U | 6.4 | 8.3 |
| Dalapon | | 23 | U | 23 | 2000 |
| Dicamba | | 12 | U | 12 | 50 |
| Dichlorprop | | 25 | U | 25 | 100 |
| Dinoseb | | 8.3 | U J3 | 8.3 | 30 |
| MCPA | | 740 | U | 740 | 2000 |
| MCPP | | 400 | U | 400 | 2000 |
| Pentachlorophenol | | 5.0 | U | 5.0 | 17 |
| Picloram | | 1.2 | U | 1.2 | 3.3 |
| Silvex (2,4,5-TP) | | 10 | U | 10 | 50 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 66 | | 10 - 135 |

**Client Sample ID:** **SB**

Lab Sample ID: 660-33886-5
Client Matrix: Water

Date Sampled: 02/16/2010 1530
Date Received: 02/18/2010 0905

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### 8151A Herbicides (GC)

Method: 8151A
Preparation: 8151A
Dilution: 1.0
Date Analyzed: 03/05/2010 0236
Date Prepared: 02/23/2010 1625

Analysis Batch: 660-91479
Prep Batch: 660-90999

Instrument ID: BSGJ
Initial Weight/Volume: 500 mL
Final Weight/Volume: 5 mL
Injection Volume: 2 uL
Result Type: PRIMARY

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 2,4,5-T | 1.0 | U | 1.0 | 5.0 |
| 2,4-D | 1.0 | U | 1.0 | 5.0 |
| 2,4-DB | 1.0 | U | 1.0 | 5.0 |
| Dalapon | 25 | U J3 | 25 | 120 |
| Dicamba | 0.25 | U | 0.25 | 1.2 |
| Dichlorprop | 1.0 | U | 1.0 | 6.0 |
| Dinoseb | 1.0 | U | 1.0 | 6.0 |
| MCPA | 34 | U J3 | 34 | 120 |
| MCPP | 35 | U | 35 | 120 |
| Pentachlorophenol | 0.085 | U | 0.085 | 1.0 |
| Picloram | 1.0 | U | 1.0 | 5.0 |
| Silvex (2,4,5-TP) | 1.0 | U | 1.0 | 5.0 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 115 | | 33 - 120 |

**Client Sample ID: 2A**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33886-6 | Date Sampled: | 02/16/2010 1100 |
| Client Matrix: | Water | Date Received: | 02/18/2010 0905 |

### 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91479 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-90999 | Initial Weight/Volume: | 970 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 03/05/2010 0253 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/23/2010 1625 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 2,4,5-T | 1.0 | U | 1.0 | 5.2 |
| 2,4-D | 1.0 | U | 1.0 | 5.2 |
| 2,4-DB | 1.0 | U | 1.0 | 5.2 |
| Dalapon | 26 | U J3 | 26 | 120 |
| Dicamba | 0.26 | U | 0.26 | 1.2 |
| Dichlorprop | 1.0 | U | 1.0 | 6.2 |
| Dinoseb | 1.0 | U | 1.0 | 6.2 |
| MCPA | 35 | U J3 | 35 | 120 |
| MCPP | 36 | U | 36 | 120 |
| Pentachlorophenol | 0.088 | U | 0.088 | 1.0 |
| Picloram | 1.0 | U | 1.0 | 5.2 |
| Silvex (2,4,5-TP) | 1.0 | U | 1.0 | 5.2 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 113 | | 33 - 120 |

**Client Sample ID: 1**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33886-7 | Date Sampled: 02/16/2010 1000 |
| Client Matrix: | Water | Date Received: 02/18/2010 0905 |

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### 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91479 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-90999 | Initial Weight/Volume: | 1000 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 03/05/2010 0311 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/23/2010 1625 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 2,4,5-T | 1.0 | U | 1.0 | 5.0 |
| 2,4-D | 1.0 | U | 1.0 | 5.0 |
| 2,4-DB | 1.0 | U | 1.0 | 5.0 |
| Dalapon | 25 | U J3 | 25 | 120 |
| Dicamba | 0.25 | U | 0.25 | 1.2 |
| Dichlorprop | 1.0 | U | 1.0 | 6.0 |
| Dinoseb | 1.0 | U | 1.0 | 6.0 |
| MCPA | 34 | U J3 | 34 | 120 |
| MCPP | 35 | U | 35 | 120 |
| Pentachlorophenol | 0.085 | U | 0.085 | 1.0 |
| Picloram | 1.0 | U | 1.0 | 5.0 |
| Silvex (2,4,5-TP) | 1.0 | U | 1.0 | 5.0 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 89 | | 33 - 120 |

**Client Sample ID:** **3B**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33886-8 | Date Sampled: | 02/16/2010 1220 |
| Client Matrix: | Water | Date Received: | 02/18/2010 0905 |

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### 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91479 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-90999 | Initial Weight/Volume: | 980 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 03/05/2010 0328 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/23/2010 1625 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 2,4,5-T | 1.0 | U | 1.0 | 5.1 |
| 2,4-D | 1.0 | U | 1.0 | 5.1 |
| 2,4-DB | 1.0 | U | 1.0 | 5.1 |
| Dalapon | 26 | U J3 | 26 | 120 |
| Dicamba | 0.26 | U | 0.26 | 1.2 |
| Dichlorprop | 1.0 | U | 1.0 | 6.1 |
| Dinoseb | 1.0 | U | 1.0 | 6.1 |
| MCPA | 35 | U J3 | 35 | 120 |
| MCPP | 36 | U | 36 | 120 |
| Pentachlorophenol | 0.087 | U | 0.087 | 1.0 |
| Picloram | 1.0 | U | 1.0 | 5.1 |
| Silvex (2,4,5-TP) | 1.0 | U | 1.0 | 5.1 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 138 | J1 | 33 - 120 |

# Analytical Data

Client: Environmental Engineering Consultant　　Job Number: 660-33886-1

**Client Sample ID: 3A**

Lab Sample ID: 660-33886-9　　Date Sampled: 02/16/2010 1240

Client Matrix: Water　　Date Received: 02/18/2010 0905

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## 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91479 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-90999 | Initial Weight/Volume: | 1050 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 03/05/2010 0345 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/23/2010 1625 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 2,4,5-T | 0.95 | U | 0.95 | 4.8 |
| 2,4-D | 0.95 | U | 0.95 | 4.8 |
| 2,4-DB | 0.95 | U | 0.95 | 4.8 |
| Dalapon | 24 | U J3 | 24 | 110 |
| Dicamba | 0.24 | U | 0.24 | 1.1 |
| Dichlorprop | 0.95 | U | 0.95 | 5.7 |
| Dinoseb | 0.95 | U | 0.95 | 5.7 |
| MCPA | 32 | U J3 | 32 | 110 |
| MCPP | 33 | U | 33 | 110 |
| Pentachlorophenol | 0.081 | U | 0.081 | 0.95 |
| Picloram | 0.95 | U | 0.95 | 4.8 |
| Silvex (2,4,5-TP) | 0.95 | U | 0.95 | 4.8 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 107 | | 33 - 120 |

**Client Sample ID:** **4B**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33886-10 | Date Sampled: | 02/16/2010 1350 |
| Client Matrix: | Water | Date Received: | 02/18/2010 0905 |

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## 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91479 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-90999 | Initial Weight/Volume: | 1055 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 03/05/2010 0401 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/23/2010 1625 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 2,4,5-T | 0.95 | U | 0.95 | 4.7 |
| 2,4-D | 0.95 | U | 0.95 | 4.7 |
| 2,4-DB | 0.95 | U | 0.95 | 4.7 |
| Dalapon | 24 | U J3 | 24 | 110 |
| Dicamba | 0.24 | U | 0.24 | 1.1 |
| Dichlorprop | 0.95 | U | 0.95 | 5.7 |
| Dinoseb | 0.95 | U | 0.95 | 5.7 |
| MCPA | 32 | U J3 | 32 | 110 |
| MCPP | 33 | U | 33 | 110 |
| Pentachlorophenol | 0.081 | U | 0.081 | 0.95 |
| Picloram | 0.95 | U | 0.95 | 4.7 |
| Silvex (2,4,5-TP) | 0.95 | U | 0.95 | 4.7 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 131 | J1 | 33 - 120 |

**Client Sample ID:** **5A**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33886-11 | Date Sampled: 02/16/2010 1330 |
| Client Matrix: | Water | Date Received: 02/18/2010 0905 |

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### 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91479 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-90999 | Initial Weight/Volume: | 970 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 03/05/2010 0418 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/23/2010 1625 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 2,4,5-T | 1.0 | U | 1.0 | 5.2 |
| 2,4-D | 1.0 | U | 1.0 | 5.2 |
| 2,4-DB | 1.0 | U | 1.0 | 5.2 |
| Dalapon | 26 | U J3 | 26 | 120 |
| Dicamba | 0.26 | U | 0.26 | 1.2 |
| Dichlorprop | 1.0 | U | 1.0 | 6.2 |
| Dinoseb | 1.0 | U | 1.0 | 6.2 |
| MCPA | 35 | U J3 | 35 | 120 |
| MCPP | 36 | U | 36 | 120 |
| Pentachlorophenol | 0.088 | U | 0.088 | 1.0 |
| Picloram | 1.0 | U | 1.0 | 5.2 |
| Silvex (2,4,5-TP) | 1.0 | U | 1.0 | 5.2 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 82 | | 33 - 120 |

## Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Client Sample ID: 4D**

Lab Sample ID: 660-33886-12
Client Matrix: Water

Date Sampled: 02/16/2010 1440
Date Received: 02/18/2010 0905

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### 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91479 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-90999 | Initial Weight/Volume: | 1040 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 03/05/2010 0434 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/23/2010 1625 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 2,4,5-T | 0.96 | U | 0.96 | 4.8 |
| 2,4-D | 0.96 | U | 0.96 | 4.8 |
| 2,4-DB | 0.96 | U | 0.96 | 4.8 |
| Dalapon | 24 | U J3 | 24 | 120 |
| Dicamba | 0.24 | U | 0.24 | 1.2 |
| Dichlorprop | 0.96 | U | 0.96 | 5.8 |
| Dinoseb | 0.96 | U | 0.96 | 5.8 |
| MCPA | 33 | U J3 | 33 | 120 |
| MCPP | 34 | U | 34 | 120 |
| Pentachlorophenol | 0.082 | U | 0.082 | 0.96 |
| Picloram | 0.96 | U | 0.96 | 4.8 |
| Silvex (2,4,5-TP) | 0.96 | U | 0.96 | 4.8 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 130 | J1 | 33 - 120 |

**Client Sample ID: 2A**

Lab Sample ID: 660-33886-1
Client Matrix: Solid

Date Sampled: 02/16/2010 1110
Date Received: 02/18/2010 0905

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### 6010B Metals (ICP)

| | | | | | |
|---|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-90852 | | Instrument ID: | ICPA |
| Preparation: | 3050B | Prep Batch: 660-90828 | | Lab File ID: | 10B19A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 1.02 g |
| Date Analyzed: | 02/19/2010 1638 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/18/2010 1533 | | | | |

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Aluminum | | 9100 | | 5.7 | 20 |
| Arsenic | | 0.78 | | 0.23 | 0.49 |
| Boron | | 7.5 | | 0.58 | 4.9 |
| Barium | | 21 | | 0.16 | 0.98 |
| Cadmium | | 0.26 | I | 0.085 | 0.49 |
| Cobalt | | 2.0 | | 0.19 | 0.98 |
| Chromium | | 4.7 | | 0.17 | 0.98 |
| Copper | | 12 | | 0.49 | 2.0 |
| Iron | | 4900 | | 2.9 | 4.9 |
| Magnesium | | 2100 | | 6.7 | 49 |
| Manganese | | 170 | | 0.21 | 0.98 |
| Sodium | | 890 | | 18 | 49 |
| Lead | | 13 | | 0.15 | 0.49 |
| Titanium | | 130 | | 0.29 | 0.98 |
| Vanadium | | 16 | | 0.11 | 0.98 |
| Zinc | | 13 | | 0.49 | 2.0 |

| | | | | | |
|---|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-90852 | | Instrument ID: | ICPA |
| Preparation: | 3050B | Prep Batch: 660-90828 | | Lab File ID: | 10B19A |
| Dilution: | 10 | | | Initial Weight/Volume: | 1.02 g |
| Date Analyzed: | 02/19/2010 1741 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/18/2010 1533 | | | | |

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Calcium | | 92000 | | 150 | 490 |

| | | | | | |
|---|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-90964 | | Instrument ID: | ICPA |
| Preparation: | 3050B | Prep Batch: 660-90828 | | Lab File ID: | 10B22A |
| Dilution: | 40 | | | Initial Weight/Volume: | 1.02 g |
| Date Analyzed: | 02/22/2010 1230 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/18/2010 1533 | | | | |

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Strontium | | 2700 | | 3.8 | 39 |

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### 7471A Mercury (CVAA)

| | | | | | |
|---|---|---|---|---|---|
| Method: | 7471A | Analysis Batch: 660-91412 | | Instrument ID: | PS200II |
| Preparation: | 7471A | Prep Batch: 660-91390 | | Lab File ID: | N/A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 0.32 g |
| Date Analyzed: | 03/04/2010 1504 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 03/04/2010 1100 | | | | |

**Client Sample ID:** **2A**

Lab Sample ID: 660-33886-1
Client Matrix: Solid

Date Sampled: 02/16/2010 1110
Date Received: 02/18/2010 0905

### 7471A Mercury (CVAA)

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Mercury | | 0.023 | | 0.0070 | 0.019 |

**Client Sample ID:** **1**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33886-2 | Date Sampled: | 02/16/2010 1010 |
| Client Matrix: | Solid | Date Received: | 02/18/2010 0905 |

### 6010B Metals (ICP)

| | | | | | |
|---|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-90852 | | Instrument ID: | ICPA |
| Preparation: | 3050B | Prep Batch: 660-90828 | | Lab File ID: | 10B19A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 1.02 g |
| Date Analyzed: | 02/19/2010 1647 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/18/2010 1533 | | | | |

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Aluminum | | 9700 | | 5.7 | 20 |
| Arsenic | | 0.54 | | 0.23 | 0.49 |
| Boron | | 2.9 | I | 0.58 | 4.9 |
| Barium | | 18 | | 0.16 | 0.98 |
| Cadmium | | 0.18 | I | 0.085 | 0.49 |
| Cobalt | | 3.4 | | 0.19 | 0.98 |
| Chromium | | 4.1 | | 0.17 | 0.98 |
| Copper | | 17 | | 0.49 | 2.0 |
| Iron | | 6200 | | 2.9 | 4.9 |
| Magnesium | | 1700 | | 6.7 | 49 |
| Manganese | | 200 | | 0.21 | 0.98 |
| Sodium | | 300 | | 18 | 49 |
| Lead | | 9.9 | | 0.15 | 0.49 |
| Titanium | | 68 | | 0.29 | 0.98 |
| Vanadium | | 14 | | 0.11 | 0.98 |
| Zinc | | 15 | | 0.49 | 2.0 |

| | | | | | |
|---|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-90852 | | Instrument ID: | ICPA |
| Preparation: | 3050B | Prep Batch: 660-90828 | | Lab File ID: | 10B19A |
| Dilution: | 10 | | | Initial Weight/Volume: | 1.02 g |
| Date Analyzed: | 02/19/2010 1747 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/18/2010 1533 | | | | |

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Calcium | | 23000 | | 150 | 490 |
| Strontium | | 810 | | 0.96 | 9.8 |

### 7471A Mercury (CVAA)

| | | | | | |
|---|---|---|---|---|---|
| Method: | 7471A | Analysis Batch: 660-91412 | | Instrument ID: | PS200II |
| Preparation: | 7471A | Prep Batch: 660-91390 | | Lab File ID: | N/A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 0.30 g |
| Date Analyzed: | 03/04/2010 1506 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 03/04/2010 1100 | | | | |

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Mercury | | 0.019 | I | 0.0075 | 0.020 |

**Client Sample ID:** **3A**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33886-3 | Date Sampled: 02/16/2010 1300 |
| Client Matrix: | Solid | Date Received: 02/18/2010 0905 |

### 6010B Metals (ICP)

| | | | | | |
|---|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-90852 | | Instrument ID: | ICPA |
| Preparation: | 3050B | Prep Batch: 660-90828 | | Lab File ID: | 10B19A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 1.01 g |
| Date Analyzed: | 02/19/2010 1653 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/18/2010 1533 | | | | |

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Aluminum | | 360 | | 5.7 | 20 |
| Arsenic | | 0.25 | I | 0.23 | 0.50 |
| Boron | | 13 | | 0.58 | 5.0 |
| Barium | | 3.3 | | 0.16 | 0.99 |
| Calcium | | 9100 | | 15 | 50 |
| Cadmium | | 0.086 | U | 0.086 | 0.50 |
| Cobalt | | 0.19 | I | 0.19 | 0.99 |
| Chromium | | 0.41 | I | 0.17 | 0.99 |
| Copper | | 2.1 | | 0.50 | 2.0 |
| Iron | | 290 | | 3.0 | 5.0 |
| Magnesium | | 780 | | 6.7 | 50 |
| Manganese | | 14 | | 0.21 | 0.99 |
| Sodium | | 820 | | 18 | 50 |
| Lead | | 3.9 | | 0.15 | 0.50 |
| Titanium | | 7.1 | | 0.30 | 0.99 |
| Vanadium | | 2.1 | | 0.11 | 0.99 |
| Zinc | | 6.0 | | 0.50 | 2.0 |

| | | | | | |
|---|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-90852 | | Instrument ID: | ICPA |
| Preparation: | 3050B | Prep Batch: 660-90828 | | Lab File ID: | 10B19A |
| Dilution: | 10 | | | Initial Weight/Volume: | 1.01 g |
| Date Analyzed: | 02/19/2010 1753 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/18/2010 1533 | | | | |

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Strontium | | 380 | | 0.97 | 9.9 |

### 7471A Mercury (CVAA)

| | | | | | |
|---|---|---|---|---|---|
| Method: | 7471A | Analysis Batch: 660-91412 | | Instrument ID: | PS200II |
| Preparation: | 7471A | Prep Batch: 660-91390 | | Lab File ID: | N/A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 0.32 g |
| Date Analyzed: | 03/04/2010 1513 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 03/04/2010 1100 | | | | |

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Mercury | | 0.011 | I | 0.0070 | 0.019 |

**Client Sample ID: 4B**

Lab Sample ID: 660-33886-4
Client Matrix: Solid

Date Sampled: 02/16/2010 1400
Date Received: 02/18/2010 0905

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### 6010B Metals (ICP)

| | | | | | |
|---|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-90852 | | Instrument ID: | ICPA |
| Preparation: | 3050B | Prep Batch: 660-90828 | | Lab File ID: | 10B19A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 1.00 g |
| Date Analyzed: | 02/19/2010 1659 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/18/2010 1533 | | | | |

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Aluminum | | 1300 | | 5.8 | 20 |
| Arsenic | | 0.64 | | 0.23 | 0.50 |
| Boron | | 7.7 | | 0.59 | 5.0 |
| Barium | | 3.7 | | 0.16 | 1.0 |
| Calcium | | 14000 | | 15 | 50 |
| Cadmium | | 0.087 | U | 0.087 | 0.50 |
| Cobalt | | 0.52 | I | 0.19 | 1.0 |
| Chromium | | 2.2 | | 0.17 | 1.0 |
| Copper | | 9.2 | | 0.50 | 2.0 |
| Iron | | 1200 | | 3.0 | 5.0 |
| Magnesium | | 640 | | 6.8 | 50 |
| Manganese | | 17 | | 0.21 | 1.0 |
| Sodium | | 640 | | 18 | 50 |
| Lead | | 27 | | 0.15 | 0.50 |
| Titanium | | 25 | | 0.30 | 1.0 |
| Vanadium | | 5.7 | | 0.11 | 1.0 |
| Zinc | | 28 | | 0.50 | 2.0 |

| | | | | | |
|---|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-90852 | | Instrument ID: | ICPA |
| Preparation: | 3050B | Prep Batch: 660-90828 | | Lab File ID: | 10B19A |
| Dilution: | 10 | | | Initial Weight/Volume: | 1.00 g |
| Date Analyzed: | 02/19/2010 1759 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/18/2010 1533 | | | | |

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Strontium | | 260 | | 0.98 | 10 |

---

### 7471A Mercury (CVAA)

| | | | | | |
|---|---|---|---|---|---|
| Method: | 7471A | Analysis Batch: 660-91412 | | Instrument ID: | PS200II |
| Preparation: | 7471A | Prep Batch: 660-91390 | | Lab File ID: | N/A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 0.31 g |
| Date Analyzed: | 03/04/2010 1515 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 03/04/2010 1100 | | | | |

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Mercury | | 0.029 | | 0.0073 | 0.019 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Client Sample ID: SB**

Lab Sample ID: 660-33886-5
Client Matrix: Water

Date Sampled: 02/16/2010 1530
Date Received: 02/18/2010 0905

---

## 6010B Metals (ICP)-Total Recoverable

| | | | | |
|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-91401 | Instrument ID: | ICPA |
| Preparation: | 3005A | Prep Batch: 660-91336 | Lab File ID: | 10C04A |
| Dilution: | 1.0 | | Initial Weight/Volume: | 50 mL |
| Date Analyzed: | 03/04/2010 1515 | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 03/03/2010 1132 | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Aluminum | 0.17 | I | 0.050 | 0.20 |
| Arsenic | 0.0040 | U | 0.0040 | 0.010 |
| Boron | 0.056 | | 0.010 | 0.050 |
| Barium | 0.0020 | U | 0.0020 | 0.010 |
| Calcium | 0.68 | | 0.10 | 0.50 |
| Cadmium | 0.0010 | U | 0.0010 | 0.0040 |
| Cobalt | 0.0020 | U | 0.0020 | 0.010 |
| Chromium | 0.0020 | U | 0.0020 | 0.010 |
| Copper | 0.0029 | U | 0.0029 | 0.010 |
| Iron | 0.095 | I | 0.050 | 0.20 |
| Magnesium | 0.051 | I | 0.020 | 0.080 |
| Manganese | 0.0021 | I | 0.0010 | 0.0040 |
| Sodium | 26 | | 0.31 | 0.50 |
| Lead | 0.0020 | U | 0.0020 | 0.010 |
| Strontium | 0.016 | | 0.0010 | 0.0050 |
| Titanium | 0.0044 | I | 0.0020 | 0.010 |
| Vanadium | 0.0025 | U | 0.0025 | 0.010 |
| Zinc | 0.026 | | 0.0050 | 0.020 |

---

## 7470A Mercury

| | | | | |
|---|---|---|---|---|
| Method: | 7470A | Analysis Batch: 660-91291 | Instrument ID: | PS200II |
| Preparation: | 7470A | Prep Batch: 660-91270 | Lab File ID: | N/A |
| Dilution: | 1.0 | | Initial Weight/Volume: | 25 mL |
| Date Analyzed: | 03/02/2010 1305 | | Final Weight/Volume: | 25 mL |
| Date Prepared: | 03/02/2010 0900 | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Mercury | 0.000072 | U | 0.000072 | 0.00020 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Client Sample ID:** **2A**

Lab Sample ID: 660-33886-6
Client Matrix: Water

Date Sampled: 02/16/2010 1100
Date Received: 02/18/2010 0905

---

### 6010B Metals (ICP)-Total Recoverable

Method: 6010B
Preparation: 3005A
Dilution: 1.0
Date Analyzed: 03/04/2010 1521
Date Prepared: 03/03/2010 1132

Analysis Batch: 660-91401
Prep Batch: 660-91336

Instrument ID: ICPA
Lab File ID: 10C04A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Copper | 0.0034 | I | 0.0029 | 0.010 |
| Iron | 1.2 | | 0.050 | 0.20 |
| Potassium | 8.2 | | 0.19 | 1.0 |
| Magnesium | 32 | | 0.020 | 0.080 |
| Sodium | 85 | | 0.31 | 0.50 |
| Lead | 0.0020 | U | 0.0020 | 0.010 |
| Zinc | 0.024 | | 0.0050 | 0.020 |

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### 7470A Mercury

Method: 7470A
Preparation: 7470A
Dilution: 1.0
Date Analyzed: 03/02/2010 1254
Date Prepared: 03/02/2010 0900

Analysis Batch: 660-91291
Prep Batch: 660-91270

Instrument ID: PS200II
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Mercury | 0.000072 | U | 0.000072 | 0.00020 |

**Client Sample ID:** **1**

Lab Sample ID: 660-33886-7
Client Matrix: Water

Date Sampled: 02/16/2010 1000
Date Received: 02/18/2010 0905

### 6010B Metals (ICP)-Total Recoverable

| | | | | |
|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-91401 | Instrument ID: | ICPA |
| Preparation: | 3005A | Prep Batch: 660-91336 | Lab File ID: | 10C04A |
| Dilution: | 1.0 | | Initial Weight/Volume: | 50 mL |
| Date Analyzed: | 03/04/2010 1527 | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 03/03/2010 1132 | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Copper | 0.0045 | I | 0.0029 | 0.010 |
| Iron | 1.5 | | 0.050 | 0.20 |
| Potassium | 12 | | 0.19 | 1.0 |
| Magnesium | 37 | | 0.020 | 0.080 |
| Lead | 0.0020 | U | 0.0020 | 0.010 |
| Zinc | 0.033 | | 0.0050 | 0.020 |

| | | | | |
|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-91401 | Instrument ID: | ICPA |
| Preparation: | 3005A | Prep Batch: 660-91336 | Lab File ID: | 10C04A |
| Dilution: | 2.0 | | Initial Weight/Volume: | 50 mL |
| Date Analyzed: | 03/04/2010 1658 | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 03/03/2010 1132 | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Sodium | 110 | | 0.62 | 1.0 |

### 7470A Mercury

| | | | | |
|---|---|---|---|---|
| Method: | 7470A | Analysis Batch: 660-91291 | Instrument ID: | PS200II |
| Preparation: | 7470A | Prep Batch: 660-91270 | Lab File ID: | N/A |
| Dilution: | 1.0 | | Initial Weight/Volume: | 25 mL |
| Date Analyzed: | 03/02/2010 1307 | | Final Weight/Volume: | 25 mL |
| Date Prepared: | 03/02/2010 0900 | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Mercury | 0.000072 | U | 0.000072 | 0.00020 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Client Sample ID:** **3B**

Lab Sample ID: 660-33886-8

Client Matrix: Water

Date Sampled: 02/16/2010 1220

Date Received: 02/18/2010 0905

## 6010B Metals (ICP)-Total Recoverable

Method: 6010B
Preparation: 3005A
Dilution: 1.0
Date Analyzed: 03/04/2010 1554
Date Prepared: 03/03/2010 1132

Analysis Batch: 660-91401
Prep Batch: 660-91336

Instrument ID: ICPA
Lab File ID: 10C04A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Copper | 0.0029 | U | 0.0029 | 0.010 |
| Iron | 0.055 | I | 0.050 | 0.20 |
| Magnesium | 90 | | 0.020 | 0.080 |
| Lead | 0.0020 | U | 0.0020 | 0.010 |
| Zinc | 0.017 | I | 0.0050 | 0.020 |

Method: 6010B
Preparation: 3005A
Dilution: 20
Date Analyzed: 03/04/2010 1704
Date Prepared: 03/03/2010 1132

Analysis Batch: 660-91401
Prep Batch: 660-91336

Instrument ID: ICPA
Lab File ID: 10C04A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Potassium | 32 | | 3.8 | 20 |
| Sodium | 600 | | 6.2 | 10 |

## 7470A Mercury

Method: 7470A
Preparation: 7470A
Dilution: 1.0
Date Analyzed: 03/02/2010 1309
Date Prepared: 03/02/2010 0900

Analysis Batch: 660-91291
Prep Batch: 660-91270

Instrument ID: PS200II
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Mercury | 0.000072 | U | 0.000072 | 0.00020 |

**Client Sample ID: 3A**

|  |  |  |
|---|---|---|
| Lab Sample ID: | 660-33886-9 | Date Sampled: 02/16/2010 1240 |
| Client Matrix: | Water | Date Received: 02/18/2010 0905 |

### 6010B Metals (ICP)-Total Recoverable

|  |  |  |  |  |
|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-91401 | Instrument ID: | ICPA |
| Preparation: | 3005A | Prep Batch: 660-91336 | Lab File ID: | 10C04A |
| Dilution: | 1.0 |  | Initial Weight/Volume: | 50 mL |
| Date Analyzed: | 03/04/2010 1600 |  | Final Weight/Volume: | 50 mL |
| Date Prepared: | 03/03/2010 1132 |  |  |  |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Copper | 0.0029 | U | 0.0029 | 0.010 |
| Iron | 0.068 | I | 0.050 | 0.20 |
| Magnesium | 91 |  | 0.020 | 0.080 |
| Lead | 0.0020 | U | 0.0020 | 0.010 |
| Zinc | 0.0050 | U | 0.0050 | 0.020 |

|  |  |  |  |  |
|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-91401 | Instrument ID: | ICPA |
| Preparation: | 3005A | Prep Batch: 660-91336 | Lab File ID: | 10C04A |
| Dilution: | 20 |  | Initial Weight/Volume: | 50 mL |
| Date Analyzed: | 03/04/2010 1710 |  | Final Weight/Volume: | 50 mL |
| Date Prepared: | 03/03/2010 1132 |  |  |  |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Potassium | 32 |  | 3.8 | 20 |
| Sodium | 610 |  | 6.2 | 10 |

### 7470A Mercury

|  |  |  |  |  |
|---|---|---|---|---|
| Method: | 7470A | Analysis Batch: 660-91291 | Instrument ID: | PS200II |
| Preparation: | 7470A | Prep Batch: 660-91270 | Lab File ID: | N/A |
| Dilution: | 1.0 |  | Initial Weight/Volume: | 25 mL |
| Date Analyzed: | 03/02/2010 1311 |  | Final Weight/Volume: | 25 mL |
| Date Prepared: | 03/02/2010 0900 |  |  |  |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Mercury | 0.000072 | U | 0.000072 | 0.00020 |

**Client Sample ID:** **4B**

Lab Sample ID: 660-33886-10
Client Matrix: Water

Date Sampled: 02/16/2010 1350
Date Received: 02/18/2010 0905

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## 6010B Metals (ICP)-Total Recoverable

| | | | | | |
|---|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-91401 | | Instrument ID: | ICPA |
| Preparation: | 3005A | Prep Batch: 660-91336 | | Lab File ID: | 10C04A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 50 mL |
| Date Analyzed: | 03/04/2010 1606 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 03/03/2010 1132 | | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Copper | 0.044 | | 0.0029 | 0.010 |
| Iron | 5.1 | | 0.050 | 0.20 |
| Potassium | 49 | | 0.19 | 1.0 |
| Magnesium | 86 | | 0.020 | 0.080 |
| Lead | 0.095 | | 0.0020 | 0.010 |
| Zinc | 0.14 | | 0.0050 | 0.020 |

| | | | | | |
|---|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-91401 | | Instrument ID: | ICPA |
| Preparation: | 3005A | Prep Batch: 660-91336 | | Lab File ID: | 10C04A |
| Dilution: | 20 | | | Initial Weight/Volume: | 50 mL |
| Date Analyzed: | 03/04/2010 1716 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 03/03/2010 1132 | | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Sodium | 440 | | 6.2 | 10 |

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## 7470A Mercury

| | | | | | |
|---|---|---|---|---|---|
| Method: | 7470A | Analysis Batch: 660-91291 | | Instrument ID: | PS200II |
| Preparation: | 7470A | Prep Batch: 660-91270 | | Lab File ID: | N/A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 25 mL |
| Date Analyzed: | 03/02/2010 1313 | | | Final Weight/Volume: | 25 mL |
| Date Prepared: | 03/02/2010 0900 | | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Mercury | 0.000072 | U | 0.000072 | 0.00020 |

**Client Sample ID: 5A**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33886-11 | Date Sampled: | 02/16/2010 1330 |
| Client Matrix: | Water | Date Received: | 02/18/2010 0905 |

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### 6010B Metals (ICP)-Total Recoverable

| | | | | |
|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-91401 | Instrument ID: | ICPA |
| Preparation: | 3005A | Prep Batch: 660-91336 | Lab File ID: | 10C04A |
| Dilution: | 1.0 | | Initial Weight/Volume: | 50 mL |
| Date Analyzed: | 03/04/2010 1612 | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 03/03/2010 1132 | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Copper | 0.012 | | 0.0029 | 0.010 |
| Iron | 8.5 | | 0.050 | 0.20 |
| Potassium | 10 | | 0.19 | 1.0 |
| Magnesium | 30 | | 0.020 | 0.080 |
| Sodium | 97 | | 0.31 | 0.50 |
| Lead | 0.0099 | I | 0.0020 | 0.010 |
| Zinc | 0.049 | | 0.0050 | 0.020 |

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### 7470A Mercury

| | | | | |
|---|---|---|---|---|
| Method: | 7470A | Analysis Batch: 660-91291 | Instrument ID: | PS200II |
| Preparation: | 7470A | Prep Batch: 660-91270 | Lab File ID: | N/A |
| Dilution: | 1.0 | | Initial Weight/Volume: | 25 mL |
| Date Analyzed: | 03/02/2010 1316 | | Final Weight/Volume: | 25 mL |
| Date Prepared: | 03/02/2010 0900 | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Mercury | 0.000072 | U | 0.000072 | 0.00020 |

**Client Sample ID:** **4D**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33886-12 | Date Sampled: | 02/16/2010 1440 |
| Client Matrix: | Water | Date Received: | 02/18/2010 0905 |

### 6010B Metals (ICP)-Total Recoverable

| | | | |
|---|---|---|---|
| Method: 6010B | Analysis Batch: 660-91401 | Instrument ID: | ICPA |
| Preparation: 3005A | Prep Batch: 660-91336 | Lab File ID: | 10C04A |
| Dilution: 1.0 | | Initial Weight/Volume: | 50 mL |
| Date Analyzed: 03/04/2010 1618 | | Final Weight/Volume: | 50 mL |
| Date Prepared: 03/03/2010 1132 | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Copper | 0.0029 | U | 0.0029 | 0.010 |
| Iron | 0.068 | I | 0.050 | 0.20 |
| Potassium | 33 | | 0.19 | 1.0 |
| Magnesium | 68 | | 0.020 | 0.080 |
| Lead | 0.0020 | U | 0.0020 | 0.010 |
| Zinc | 0.0050 | U | 0.0050 | 0.020 |

| | | | |
|---|---|---|---|
| Method: 6010B | Analysis Batch: 660-91401 | Instrument ID: | ICPA |
| Preparation: 3005A | Prep Batch: 660-91336 | Lab File ID: | 10C04A |
| Dilution: 10 | | Initial Weight/Volume: | 50 mL |
| Date Analyzed: 03/04/2010 1722 | | Final Weight/Volume: | 50 mL |
| Date Prepared: 03/03/2010 1132 | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Sodium | 340 | | 3.1 | 5.0 |

### 7470A Mercury

| | | | |
|---|---|---|---|
| Method: 7470A | Analysis Batch: 660-91291 | Instrument ID: | PS200II |
| Preparation: 7470A | Prep Batch: 660-91270 | Lab File ID: | N/A |
| Dilution: 1.0 | | Initial Weight/Volume: | 25 mL |
| Date Analyzed: 03/02/2010 1318 | | Final Weight/Volume: | 25 mL |
| Date Prepared: 03/02/2010 0900 | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Mercury | 0.000072 | U | 0.000072 | 0.00020 |

# Analytical Data

Client: Environmental Engineering Consultant Job Number: 660-33886-1

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## General Chemistry

**Client Sample ID:** **2A**

Lab Sample ID: 660-33886-1 Date Sampled: 02/16/2010 1110

Client Matrix: Solid Date Received: 02/18/2010 0905

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Ammonia (as N) | 2.1 | | mg/Kg | 0.13 | 0.30 | 1.0 | 350.1 |
| | Analysis Batch: 680-161811 | Date Analyzed: 02/26/2010 1112 | | | | | DryWt Corrected: N |
| | Prep Batch: 680-161659 | Date Prepared: 02/25/2010 1234 | | | | | |
| Nitrite as N-Soluble | 1.5 | I | mg/Kg | 1.0 | 5.0 | 1.0 | 353.2 |
| | Analysis Batch: 660-91352 | Date Analyzed: 03/03/2010 0939 | | | | | DryWt Corrected: N |
| Nitrate as N-Soluble | 1.0 | U | mg/Kg | 1.0 | 5.0 | 1.0 | 353.2 |
| | Analysis Batch: 660-91352 | Date Analyzed: 03/03/2010 0939 | | | | | DryWt Corrected: N |
| Phosphorus | 2300 | | mg/Kg | 50 | 91 | 5.0 | 365.4 |
| | Analysis Batch: 680-161565 | Date Analyzed: 02/24/2010 1446 | | | | | DryWt Corrected: N |
| | Prep Batch: 680-161349 | Date Prepared: 02/22/2010 1258 | | | | | |
| Total Organic Carbon | 35000 | | mg/Kg | 1000 | 3000 | 1.0 | 9060 |
| | Analysis Batch: 680-161519 | Date Analyzed: 02/23/2010 1035 | | | | | DryWt Corrected: N |
| Orthophosphate-Soluble | 3.5 | | mg/L | 0.75 | 3.0 | 1.0 | SM 4500 P E |
| | Analysis Batch: 660-91342 | Date Analyzed: 03/02/2010 1600 | | | | | DryWt Corrected: N |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Sulfide | 25 | U | mg/Kg | 25 | 25 | 1.0 | 9034 |
| | Analysis Batch: 680-161436 | Date Analyzed: 02/23/2010 1430 | | | | | DryWt Corrected: N |
| | Prep Batch: 680-161395 | Date Prepared: 02/23/2010 1144 | | | | | |
| Sulfate-Soluble | 100 | U | mg/Kg | 100 | 100 | 1.0 | 9038 |
| | Analysis Batch: 680-162106 | Date Analyzed: 03/02/2010 1718 | | | | | DryWt Corrected: N |
| pH-Soluble | 8.11 | Q | SU | 1.00 | 1.00 | 1.0 | 9045C |
| | Analysis Batch: 660-90922 | Date Analyzed: 02/18/2010 2145 | | | | | DryWt Corrected: N |
| Percent Solids | 37 | | % | 0.10 | 0.10 | 1.0 | Moisture |
| | Analysis Batch: 660-90835 | Date Analyzed: 02/18/2010 1421 | | | | | DryWt Corrected: N |

### General Chemistry

**Client Sample ID: 1**

Lab Sample ID: 660-33886-2
Client Matrix: Solid

Date Sampled: 02/16/2010 1010
Date Received: 02/18/2010 0905

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Ammonia (as N) | 65 | | mg/Kg | 1.3 | 3.0 | 10 | 350.1 |
| | Analysis Batch: 680-161811 | | Date Analyzed: 02/26/2010 1159 | | | | DryWt Corrected: N |
| | Prep Batch: 680-161659 | | Date Prepared: 02/25/2010 1234 | | | | |
| Nitrite as N-Soluble | 1.0 | U | mg/Kg | 1.0 | 5.0 | 1.0 | 353.2 |
| | Analysis Batch: 660-91352 | | Date Analyzed: 03/03/2010 0939 | | | | DryWt Corrected: N |
| Nitrate as N-Soluble | 1.0 | U | mg/Kg | 1.0 | 5.0 | 1.0 | 353.2 |
| | Analysis Batch: 660-91352 | | Date Analyzed: 03/03/2010 0939 | | | | DryWt Corrected: N |
| Phosphorus | 690 | | mg/Kg | 10 | 19 | 1.0 | 365.4 |
| | Analysis Batch: 680-161565 | | Date Analyzed: 02/24/2010 1410 | | | | DryWt Corrected: N |
| | Prep Batch: 680-161349 | | Date Prepared: 02/22/2010 1258 | | | | |
| Total Organic Carbon | 42000 | | mg/Kg | 1000 | 3000 | 1.0 | 9060 |
| | Analysis Batch: 680-161519 | | Date Analyzed: 02/23/2010 1035 | | | | DryWt Corrected: N |
| Orthophosphate-Soluble | 1.6 | I | mg/L | 0.75 | 3.0 | 1.0 | SM 4500 P E |
| | Analysis Batch: 660-91342 | | Date Analyzed: 03/02/2010 1600 | | | | DryWt Corrected: N |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Sulfide | 47 | | mg/Kg | 25 | 25 | 1.0 | 9034 |
| | Analysis Batch: 680-161436 | | Date Analyzed: 02/23/2010 1430 | | | | DryWt Corrected: N |
| | Prep Batch: 680-161395 | | Date Prepared: 02/23/2010 1144 | | | | |
| Sulfate-Soluble | 100 | U | mg/Kg | 100 | 100 | 1.0 | 9038 |
| | Analysis Batch: 680-162106 | | Date Analyzed: 03/02/2010 1718 | | | | DryWt Corrected: N |
| pH-Soluble | 7.89 | Q | SU | 1.00 | 1.00 | 1.0 | 9045C |
| | Analysis Batch: 660-90922 | | Date Analyzed: 02/18/2010 2145 | | | | DryWt Corrected: N |
| Percent Solids | 22 | | % | 0.10 | 0.10 | 1.0 | Moisture |
| | Analysis Batch: 660-90835 | | Date Analyzed: 02/18/2010 1416 | | | | DryWt Corrected: N |

# Analytical Data

Client: Environmental Engineering Consultant | Job Number: 660-33886-1

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### General Chemistry

**Client Sample ID:** **3A**

Lab Sample ID: 660-33886-3
Client Matrix: Solid

Date Sampled: 02/16/2010 1300
Date Received: 02/18/2010 0905

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Ammonia (as N) | 6.9 | | mg/Kg | 0.13 | 0.30 | 1.0 | 350.1 |
| | Analysis Batch: 680-161811 | Date Analyzed: 02/26/2010 1120 | | | | | DryWt Corrected: N |
| | Prep Batch: 680-161659 | Date Prepared: 02/25/2010 1234 | | | | | |
| Nitrite as N-Soluble | 1.0 | U | mg/Kg | 1.0 | 5.0 | 1.0 | 353.2 |
| | Analysis Batch: 660-91352 | Date Analyzed: 03/03/2010 0939 | | | | | DryWt Corrected: N |
| Nitrate as N-Soluble | 1.0 | U | mg/Kg | 1.0 | 5.0 | 1.0 | 353.2 |
| | Analysis Batch: 660-91352 | Date Analyzed: 03/03/2010 0939 | | | | | DryWt Corrected: N |
| Phosphorus | 240 | | mg/Kg | 9.3 | 17 | 1.0 | 365.4 |
| | Analysis Batch: 680-161565 | Date Analyzed: 02/24/2010 1410 | | | | | DryWt Corrected: N |
| | Prep Batch: 680-161349 | Date Prepared: 02/22/2010 1258 | | | | | |
| Total Organic Carbon | 210000 | | mg/Kg | 1000 | 3000 | 1.0 | 9060 |
| | Analysis Batch: 680-161519 | Date Analyzed: 02/23/2010 1035 | | | | | DryWt Corrected: N |
| Orthophosphate-Soluble | 0.87 | I | mg/L | 0.75 | 3.0 | 1.0 | SM 4500 P E |
| | Analysis Batch: 660-91342 | Date Analyzed: 03/02/2010 1600 | | | | | DryWt Corrected: N |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Sulfide | 25 | U | mg/Kg | 25 | 25 | 1.0 | 9034 |
| | Analysis Batch: 680-161436 | Date Analyzed: 02/23/2010 1430 | | | | | DryWt Corrected: N |
| | Prep Batch: 680-161395 | Date Prepared: 02/23/2010 1354 | | | | | |
| Sulfate-Soluble | 98 | U | mg/Kg | 98 | 98 | 1.0 | 9038 |
| | Analysis Batch: 680-162106 | Date Analyzed: 03/02/2010 1718 | | | | | DryWt Corrected: N |
| pH-Soluble | 7.84 | Q | SU | 1.00 | 1.00 | 1.0 | 9045C |
| | Analysis Batch: 660-90922 | Date Analyzed: 02/18/2010 2145 | | | | | DryWt Corrected: N |
| Percent Solids | 6.6 | | % | 0.10 | 0.10 | 1.0 | Moisture |
| | Analysis Batch: 660-90835 | Date Analyzed: 02/18/2010 1356 | | | | | DryWt Corrected: N |

## General Chemistry

**Client Sample ID:** **4B**

Lab Sample ID: 660-33886-4
Client Matrix: Solid

Date Sampled: 02/16/2010 1400
Date Received: 02/18/2010 0905

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Ammonia (as N) | 11 | | mg/Kg | 0.26 | 0.60 | 2.0 | 350.1 |
| | Analysis Batch: 680-161811 | Date Analyzed: 02/26/2010 1159 | | | | | DryWt Corrected: N |
| | Prep Batch: 680-161659 | Date Prepared: 02/25/2010 1234 | | | | | |
| Nitrite as N-Soluble | 1.0 | U | mg/Kg | 1.0 | 5.0 | 1.0 | 353.2 |
| | Analysis Batch: 660-91352 | Date Analyzed: 03/03/2010 0939 | | | | | DryWt Corrected: N |
| Nitrate as N-Soluble | 1.0 | U | mg/Kg | 1.0 | 5.0 | 1.0 | 353.2 |
| | Analysis Batch: 660-91352 | Date Analyzed: 03/03/2010 0939 | | | | | DryWt Corrected: N |
| Phosphorus | 140 | | mg/Kg | 11 | 20 | 1.0 | 365.4 |
| | Analysis Batch: 680-161565 | Date Analyzed: 02/24/2010 1410 | | | | | DryWt Corrected: N |
| | Prep Batch: 680-161349 | Date Prepared: 02/22/2010 1258 | | | | | |
| Total Organic Carbon | 150000 | | mg/Kg | 1000 | 3000 | 1.0 | 9060 |
| | Analysis Batch: 680-161519 | Date Analyzed: 02/23/2010 1035 | | | | | DryWt Corrected: N |
| Orthophosphate-Soluble | 1.5 | I | mg/L | 0.75 | 3.0 | 1.0 | SM 4500 P E |
| | Analysis Batch: 660-91342 | Date Analyzed: 03/02/2010 1600 | | | | | DryWt Corrected: N |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Sulfide | 25 | U | mg/Kg | 25 | 25 | 1.0 | 9034 |
| | Analysis Batch: 680-161436 | Date Analyzed: 02/23/2010 1430 | | | | | DryWt Corrected: N |
| | Prep Batch: 680-161395 | Date Prepared: 02/23/2010 1354 | | | | | |
| Sulfate-Soluble | 97 | U | mg/Kg | 97 | 97 | 1.0 | 9038 |
| | Analysis Batch: 680-162106 | Date Analyzed: 03/02/2010 1720 | | | | | DryWt Corrected: N |
| pH-Soluble | 7.53 | Q | SU | 1.00 | 1.00 | 1.0 | 9045C |
| | Analysis Batch: 660-90922 | Date Analyzed: 02/18/2010 2145 | | | | | DryWt Corrected: N |
| Percent Solids | 8.6 | | % | 0.10 | 0.10 | 1.0 | Moisture |
| | Analysis Batch: 660-90835 | Date Analyzed: 02/18/2010 1348 | | | | | DryWt Corrected: N |

### General Chemistry

**Client Sample ID:** **SB**

Lab Sample ID: 660-33886-5
Client Matrix: Water

Date Sampled: 02/16/2010 1530
Date Received: 02/18/2010 0905

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Ammonia (as N) | 0.13 | | mg/L | 0.010 | 0.020 | 1.0 | 350.1 |
| Analysis Batch: 660-91191 | Date Analyzed: 02/26/2010 1452 | | | | | | |
| Nitrite as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| Analysis Batch: 660-90906 | Date Analyzed: 02/18/2010 1002 | | | | | | |
| Nitrate as N | 3.3 | | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| Analysis Batch: 660-90906 | Date Analyzed: 02/18/2010 1002 | | | | | | |
| Orthophosphate-Dissolved | 0.010 | U | mg/L | 0.010 | 0.040 | 1.0 | 365.1 |
| Analysis Batch: 660-91108 | Date Analyzed: 02/18/2010 1328 | | | | | | |
| Phosphorus, Total | 0.10 | U | mg/L | 0.10 | 0.30 | 1.0 | 365.4 |
| Analysis Batch: 660-91349 | Date Analyzed: 03/03/2010 1113 | | | | | | |
| Prep Batch: 660-91250 | Date Prepared: 03/01/2010 1700 | | | | | | |
| Sulfate | 2.0 | U | mg/L | 2.0 | 5.0 | 1.0 | SM 426C |
| Analysis Batch: 660-91434 | Date Analyzed: 03/04/2010 1100 | | | | | | |
| Total Organic Carbon | 0.46 | I | mg/L | 0.35 | 1.0 | 1.0 | SM 5310C |
| Analysis Batch: 640-65864 | Date Analyzed: 02/19/2010 1514 | | | | | | |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Sulfide | 1.0 | U | mg/L | 1.0 | 1.0 | 1.0 | SM 4500 S2 F |
| Analysis Batch: 660-90918 | Date Analyzed: 02/19/2010 1600 | | | | | | |

### General Chemistry

**Client Sample ID:** **2A**

Lab Sample ID: 660-33886-6
Client Matrix: Water

Date Sampled: 02/16/2010 1100
Date Received: 02/18/2010 0905

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Nitrite as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| Analysis Batch: 660-90906 | Date Analyzed: 02/18/2010 1002 | | | | | | |
| Nitrate as N | 0.33 | I | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| Analysis Batch: 660-90906 | Date Analyzed: 02/18/2010 1002 | | | | | | |
| Phosphorus, Total | 0.21 | I | mg/L | 0.10 | 0.30 | 1.0 | 365.4 |
| Analysis Batch: 660-91349 | Date Analyzed: 03/03/2010 1113 | | | | | | |
| Prep Batch: 660-91250 | Date Prepared: 03/01/2010 1700 | | | | | | |
| Sulfate | 45 | | mg/L | 4.0 | 10 | 2.0 | SM 426C |
| Analysis Batch: 660-91248 | Date Analyzed: 03/01/2010 1350 | | | | | | |
| Chloride | 89 | | mg/L | 6.0 | 10 | 2.0 | SM 4500 Cl- E |
| Analysis Batch: 660-91159 | Date Analyzed: 02/25/2010 1400 | | | | | | |
| Chemical Oxygen Demand | 15 | I | mg/L | 10 | 20 | 1.0 | SM 5220D |
| Analysis Batch: 660-91132 | Date Analyzed: 02/25/2010 1557 | | | | | | |
| Prep Batch: 660-91131 | Date Prepared: 02/25/2010 1333 | | | | | | |
| Tannins and Lignins | 0.70 | | mg/L | 0.037 | 0.10 | 1.0 | SM 5550B |
| Analysis Batch: 680-161223 | Date Analyzed: 02/19/2010 1126 | | | | | | |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Turbidity | 4.9 | | NTU | 0.10 | 0.10 | 1.0 | 180.1 |
| Analysis Batch: 660-90879 | Date Analyzed: 02/18/2010 0930 | | | | | | |
| Biochemical Oxygen Demand | 4.38 | Q | mg/L | 2.00 | 2.00 | 1.0 | 405.1 |
| Analysis Batch: 660-91308 | Date Analyzed: 02/23/2010 0830 | | | | | | |
| Chlorophyll a | 25.3 | Q | ug/L | 2.00 | 2.00 | 1.0 | SM 10200H |
| Analysis Batch: 660-91277 | Date Analyzed: 02/23/2010 1020 | | | | | | |
| Alkalinity | 340 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2320B |
| Analysis Batch: 660-90996 | Date Analyzed: 02/23/2010 1205 | | | | | | |
| Salinity | 2.0 | U | ppt | 2.0 | 2.0 | 1.0 | SM 2520B |
| Analysis Batch: 660-91136 | Date Analyzed: 02/25/2010 1200 | | | | | | |
| Total Suspended Solids | 11 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2540D |
| Analysis Batch: 660-90872 | Date Analyzed: 02/19/2010 1459 | | | | | | |
| Sulfide | 1.0 | U | mg/L | 1.0 | 1.0 | 1.0 | SM 4500 S2 F |
| Analysis Batch: 660-90918 | Date Analyzed: 02/19/2010 1600 | | | | | | |

### General Chemistry

**Client Sample ID: 1**

Lab Sample ID: 660-33886-7
Client Matrix: Water

Date Sampled: 02/16/2010 1000
Date Received: 02/18/2010 0905

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Nitrite as N | 0.10 | U Q | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| Analysis Batch: 660-90906 | Date Analyzed: 02/18/2010 1002 | | | | | | |
| Nitrate as N | 0.10 | U Q | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| Analysis Batch: 660-90906 | Date Analyzed: 02/18/2010 1002 | | | | | | |
| Phosphorus, Total | 0.13 | I | mg/L | 0.10 | 0.30 | 1.0 | 365.4 |
| Analysis Batch: 660-91349 | Date Analyzed: 03/03/2010 1113 | | | | | | |
| Prep Batch: 660-91250 | Date Prepared: 03/01/2010 1700 | | | | | | |
| Sulfate | 50 | | mg/L | 4.0 | 10 | 2.0 | SM 426C |
| Analysis Batch: 660-91248 | Date Analyzed: 03/01/2010 1350 | | | | | | |
| Chloride | 140 | | mg/L | 6.0 | 10 | 2.0 | SM 4500 Cl- E |
| Analysis Batch: 660-91159 | Date Analyzed: 02/25/2010 1400 | | | | | | |
| Chemical Oxygen Demand | 44 | | mg/L | 10 | 20 | 1.0 | SM 5220D |
| Analysis Batch: 660-91132 | Date Analyzed: 02/25/2010 1557 | | | | | | |
| Prep Batch: 660-91131 | Date Prepared: 02/25/2010 1333 | | | | | | |
| Tannins and Lignins | 0.92 | | mg/L | 0.037 | 0.10 | 1.0 | SM 5550B |
| Analysis Batch: 680-161223 | Date Analyzed: 02/19/2010 1130 | | | | | | |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Turbidity | 11 | | NTU | 0.10 | 0.10 | 1.0 | 180.1 |
| Analysis Batch: 660-90879 | Date Analyzed: 02/18/2010 0930 | | | | | | |
| Biochemical Oxygen Demand | 7.38 | Q | mg/L | 2.00 | 2.00 | 1.0 | 405.1 |
| Analysis Batch: 660-91308 | Date Analyzed: 02/23/2010 0830 | | | | | | |
| Chlorophyll a | 137 | Q | ug/L | 2.00 | 2.00 | 1.0 | SM 10200H |
| Analysis Batch: 660-91277 | Date Analyzed: 02/23/2010 1022 | | | | | | |
| Alkalinity | 210 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2320B |
| Analysis Batch: 660-90996 | Date Analyzed: 02/23/2010 1211 | | | | | | |
| Salinity | 2.0 | U | ppt | 2.0 | 2.0 | 1.0 | SM 2520B |
| Analysis Batch: 660-91136 | Date Analyzed: 02/25/2010 1200 | | | | | | |
| Total Suspended Solids | 32 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2540D |
| Analysis Batch: 660-90872 | Date Analyzed: 02/19/2010 1459 | | | | | | |
| Sulfide | 1.0 | U | mg/L | 1.0 | 1.0 | 1.0 | SM 4500 S2 F |
| Analysis Batch: 660-90918 | Date Analyzed: 02/19/2010 1600 | | | | | | |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

## General Chemistry

**Client Sample ID:** **3B**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33886-8 | Date Sampled: | 02/16/2010 1220 |
| Client Matrix: | Water | Date Received: | 02/18/2010 0905 |

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Nitrite as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| Analysis Batch: 660-90906 | | Date Analyzed: 02/18/2010 1002 | | | | | |
| Nitrate as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| Analysis Batch: 660-90906 | | Date Analyzed: 02/18/2010 1002 | | | | | |
| Phosphorus, Total | 0.12 | I | mg/L | 0.10 | 0.30 | 1.0 | 365.4 |
| Analysis Batch: 660-91349 | | Date Analyzed: 03/03/2010 1113 | | | | | |
| Prep Batch: 660-91250 | | Date Prepared: 03/01/2010 1700 | | | | | |
| Sulfate | 140 | | mg/L | 10 | 25 | 5.0 | SM 426C |
| Analysis Batch: 660-91248 | | Date Analyzed: 03/01/2010 1350 | | | | | |
| Chloride | 960 | | mg/L | 60 | 100 | 20 | SM 4500 Cl- E |
| Analysis Batch: 660-91159 | | Date Analyzed: 02/25/2010 1400 | | | | | |
| Chemical Oxygen Demand | 48 | | mg/L | 10 | 20 | 1.0 | SM 5220D |
| Analysis Batch: 660-91132 | | Date Analyzed: 02/25/2010 1557 | | | | | |
| Prep Batch: 660-91131 | | Date Prepared: 02/25/2010 1333 | | | | | |
| Tannins and Lignins | 1.6 | | mg/L | 0.037 | 0.10 | 1.0 | SM 5550B |
| Analysis Batch: 680-161223 | | Date Analyzed: 02/19/2010 1130 | | | | | |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Turbidity | 2.9 | | NTU | 0.10 | 0.10 | 1.0 | 180.1 |
| Analysis Batch: 660-90879 | | Date Analyzed: 02/18/2010 0930 | | | | | |
| Biochemical Oxygen Demand | 4.64 | Q | mg/L | 2.00 | 2.00 | 1.0 | 405.1 |
| Analysis Batch: 660-91308 | | Date Analyzed: 02/23/2010 0830 | | | | | |
| Chlorophyll a | 22.6 | Q | ug/L | 2.00 | 2.00 | 1.0 | SM 10200H |
| Analysis Batch: 660-91277 | | Date Analyzed: 02/23/2010 1023 | | | | | |
| Alkalinity | 440 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2320B |
| Analysis Batch: 660-90996 | | Date Analyzed: 02/23/2010 1219 | | | | | |
| Salinity | 2.5 | | ppt | 2.0 | 2.0 | 1.0 | SM 2520B |
| Analysis Batch: 660-91136 | | Date Analyzed: 02/25/2010 1200 | | | | | |
| Total Suspended Solids | 8.4 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2540D |
| Analysis Batch: 660-90872 | | Date Analyzed: 02/19/2010 1459 | | | | | |
| Sulfide | 1.0 | U | mg/L | 1.0 | 1.0 | 1.0 | SM 4500 S2 F |
| Analysis Batch: 660-90918 | | Date Analyzed: 02/19/2010 1600 | | | | | |

## General Chemistry

**Client Sample ID:** **3A**

Lab Sample ID: 660-33886-9
Client Matrix: Water

Date Sampled: 02/16/2010 1240
Date Received: 02/18/2010 0905

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Nitrite as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| Analysis Batch: 660-90906 | | Date Analyzed: 02/18/2010 1002 | | | | | |
| Nitrate as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| Analysis Batch: 660-90906 | | Date Analyzed: 02/18/2010 1002 | | | | | |
| Phosphorus, Total | 0.15 | I | mg/L | 0.10 | 0.30 | 1.0 | 365.4 |
| Analysis Batch: 660-91349 | | Date Analyzed: 03/03/2010 1113 | | | | | |
| Prep Batch: 660-91250 | | Date Prepared: 03/01/2010 1700 | | | | | |
| Sulfate | 140 | | mg/L | 10 | 25 | 5.0 | SM 426C |
| Analysis Batch: 660-91248 | | Date Analyzed: 03/01/2010 1350 | | | | | |
| Chloride | 1000 | | mg/L | 60 | 100 | 20 | SM 4500 Cl- E |
| Analysis Batch: 660-91159 | | Date Analyzed: 02/25/2010 1400 | | | | | |
| Chemical Oxygen Demand | 51 | | mg/L | 10 | 20 | 1.0 | SM 5220D |
| Analysis Batch: 660-91132 | | Date Analyzed: 02/25/2010 1557 | | | | | |
| Prep Batch: 660-91131 | | Date Prepared: 02/25/2010 1333 | | | | | |
| Tannins and Lignins | 1.5 | | mg/L | 0.037 | 0.10 | 1.0 | SM 5550B |
| Analysis Batch: 680-161223 | | Date Analyzed: 02/19/2010 1130 | | | | | |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Turbidity | 2.9 | | NTU | 0.10 | 0.10 | 1.0 | 180.1 |
| Analysis Batch: 660-90879 | | Date Analyzed: 02/18/2010 0930 | | | | | |
| Biochemical Oxygen Demand | 2.58 | Q | mg/L | 2.00 | 2.00 | 1.0 | 405.1 |
| Analysis Batch: 660-91308 | | Date Analyzed: 02/23/2010 0830 | | | | | |
| Chlorophyll a | 21.1 | Q | ug/L | 2.00 | 2.00 | 1.0 | SM 10200H |
| Analysis Batch: 660-91277 | | Date Analyzed: 02/23/2010 1024 | | | | | |
| Alkalinity | 440 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2320B |
| Analysis Batch: 660-90996 | | Date Analyzed: 02/23/2010 1226 | | | | | |
| Salinity | 2.5 | | ppt | 2.0 | 2.0 | 1.0 | SM 2520B |
| Analysis Batch: 660-91136 | | Date Analyzed: 02/25/2010 1200 | | | | | |
| Total Suspended Solids | 18 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2540D |
| Analysis Batch: 660-90872 | | Date Analyzed: 02/19/2010 1459 | | | | | |
| Sulfide | 1.0 | U | mg/L | 1.0 | 1.0 | 1.0 | SM 4500 S2 F |
| Analysis Batch: 660-90918 | | Date Analyzed: 02/19/2010 1600 | | | | | |

### General Chemistry

**Client Sample ID:** **4B**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33886-10 | Date Sampled: | 02/16/2010 1350 |
| Client Matrix: | Water | Date Received: | 02/18/2010 0905 |

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Nitrite as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| | Analysis Batch: 660-90906 | Date Analyzed: 02/18/2010 1002 | | | | | |
| Nitrate as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| | Analysis Batch: 660-90906 | Date Analyzed: 02/18/2010 1002 | | | | | |
| Phosphorus, Total | 0.26 | I | mg/L | 0.10 | 0.30 | 1.0 | 365.4 |
| | Analysis Batch: 660-91349 | Date Analyzed: 03/03/2010 1113 | | | | | |
| | Prep Batch: 660-91250 | Date Prepared: 03/01/2010 1700 | | | | | |
| Sulfate | 110 | | mg/L | 10 | 25 | 5.0 | SM 426C |
| | Analysis Batch: 660-91248 | Date Analyzed: 03/01/2010 1350 | | | | | |
| Chloride | 590 | | mg/L | 60 | 100 | 20 | SM 4500 Cl- E |
| | Analysis Batch: 660-91159 | Date Analyzed: 02/25/2010 1400 | | | | | |
| Chemical Oxygen Demand | 270 | | mg/L | 10 | 20 | 1.0 | SM 5220D |
| | Analysis Batch: 660-91274 | Date Analyzed: 03/02/2010 1021 | | | | | |
| | Prep Batch: 660-91273 | Date Prepared: 03/01/2010 1230 | | | | | |
| Tannins and Lignins | 4.4 | | mg/L | 0.18 | 0.50 | 5.0 | SM 5550B |
| | Analysis Batch: 680-161223 | Date Analyzed: 02/19/2010 1158 | | | | | |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Turbidity | 12 | | NTU | 0.10 | 0.10 | 1.0 | 180.1 |
| | Analysis Batch: 660-90879 | Date Analyzed: 02/18/2010 0930 | | | | | |
| Biochemical Oxygen Demand | 6.55 | Q | mg/L | 2.00 | 2.00 | 1.0 | 405.1 |
| | Analysis Batch: 660-91308 | Date Analyzed: 02/23/2010 0830 | | | | | |
| Chlorophyll a | 4.40 | Q | ug/L | 2.00 | 2.00 | 1.0 | SM 10200H |
| | Analysis Batch: 660-91277 | Date Analyzed: 02/23/2010 1025 | | | | | |
| Alkalinity | 650 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2320B |
| | Analysis Batch: 660-90996 | Date Analyzed: 02/23/2010 1235 | | | | | |
| Salinity | 2.0 | | ppt | 2.0 | 2.0 | 1.0 | SM 2520B |
| | Analysis Batch: 660-91136 | Date Analyzed: 02/25/2010 1200 | | | | | |
| Total Suspended Solids | 39 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2540D |
| | Analysis Batch: 660-90872 | Date Analyzed: 02/19/2010 1459 | | | | | |
| Sulfide | 1.3 | | mg/L | 1.0 | 1.0 | 1.0 | SM 4500 S2 F |
| | Analysis Batch: 660-90918 | Date Analyzed: 02/19/2010 1600 | | | | | |

### General Chemistry

**Client Sample ID:** **5A**

Lab Sample ID: 660-33886-11
Client Matrix: Water

Date Sampled: 02/16/2010 1330
Date Received: 02/18/2010 0905

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Nitrite as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| Analysis Batch: 660-90906 | | Date Analyzed: 02/18/2010 1002 | | | | | |
| Nitrate as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| Analysis Batch: 660-90906 | | Date Analyzed: 02/18/2010 1002 | | | | | |
| Phosphorus, Total | 0.23 | I | mg/L | 0.10 | 0.30 | 1.0 | 365.4 |
| Analysis Batch: 660-91349 | | Date Analyzed: 03/03/2010 1113 | | | | | |
| Prep Batch: 660-91250 | | Date Prepared: 03/01/2010 1700 | | | | | |
| Sulfate | 48 | | mg/L | 8.0 | 20 | 4.0 | SM 426C |
| Analysis Batch: 660-91248 | | Date Analyzed: 03/01/2010 1350 | | | | | |
| Chloride | 110 | | mg/L | 6.0 | 10 | 2.0 | SM 4500 Cl- E |
| Analysis Batch: 660-91159 | | Date Analyzed: 02/25/2010 1400 | | | | | |
| Chemical Oxygen Demand | 34 | | mg/L | 10 | 20 | 1.0 | SM 5220D |
| Analysis Batch: 660-91132 | | Date Analyzed: 02/25/2010 1557 | | | | | |
| Prep Batch: 660-91131 | | Date Prepared: 02/25/2010 1333 | | | | | |
| Tannins and Lignins | 0.51 | | mg/L | 0.037 | 0.10 | 1.0 | SM 5550B |
| Analysis Batch: 680-161223 | | Date Analyzed: 02/19/2010 1130 | | | | | |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Turbidity | 46 | | NTU | 0.20 | 0.20 | 2.0 | 180.1 |
| Analysis Batch: 660-90879 | | Date Analyzed: 02/18/2010 0930 | | | | | |
| Biochemical Oxygen Demand | 8.84 | Q | mg/L | 2.00 | 2.00 | 1.0 | 405.1 |
| Analysis Batch: 660-91308 | | Date Analyzed: 02/23/2010 0830 | | | | | |
| Chlorophyll a | 22.0 | Q | ug/L | 2.00 | 2.00 | 1.0 | SM 10200H |
| Analysis Batch: 660-91277 | | Date Analyzed: 02/23/2010 1027 | | | | | |
| Alkalinity | 210 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2320B |
| Analysis Batch: 660-90996 | | Date Analyzed: 02/23/2010 1241 | | | | | |
| Salinity | 2.0 | U | ppt | 2.0 | 2.0 | 1.0 | SM 2520B |
| Analysis Batch: 660-91136 | | Date Analyzed: 02/25/2010 1200 | | | | | |
| Total Suspended Solids | 280 | | mg/L | 4.2 | 4.2 | 1.0 | SM 2540D |
| Analysis Batch: 660-90872 | | Date Analyzed: 02/19/2010 1500 | | | | | |
| Sulfide | 1.0 | U | mg/L | 1.0 | 1.0 | 1.0 | SM 4500 S2 F |
| Analysis Batch: 660-90918 | | Date Analyzed: 02/19/2010 1600 | | | | | |

## General Chemistry

**Client Sample ID:** **4D**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33886-12 | Date Sampled: | 02/16/2010 1440 |
| Client Matrix: | Water | Date Received: | 02/18/2010 0905 |

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Nitrite as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| | Analysis Batch: 660-90906 | | Date Analyzed: 02/18/2010 1002 | | | | |
| Nitrate as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| | Analysis Batch: 660-90906 | | Date Analyzed: 02/18/2010 1002 | | | | |
| Phosphorus, Total | 0.55 | | mg/L | 0.10 | 0.30 | 1.0 | 365.4 |
| | Analysis Batch: 660-91349 | | Date Analyzed: 03/03/2010 1113 | | | | |
| | Prep Batch: 660-91250 | | Date Prepared: 03/01/2010 1700 | | | | |
| Sulfate | 69 | | mg/L | 4.0 | 10 | 2.0 | SM 426C |
| | Analysis Batch: 660-91248 | | Date Analyzed: 03/01/2010 1350 | | | | |
| Chloride | 500 | | mg/L | 60 | 100 | 20 | SM 4500 Cl- E |
| | Analysis Batch: 660-91159 | | Date Analyzed: 02/25/2010 1400 | | | | |
| Chemical Oxygen Demand | 55 | | mg/L | 10 | 20 | 1.0 | SM 5220D |
| | Analysis Batch: 660-91132 | | Date Analyzed: 02/25/2010 1557 | | | | |
| | Prep Batch: 660-91131 | | Date Prepared: 02/25/2010 1333 | | | | |
| Tannins and Lignins | 4.0 | | mg/L | 0.18 | 0.50 | 5.0 | SM 5550B |
| | Analysis Batch: 680-161223 | | Date Analyzed: 02/19/2010 1158 | | | | |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Turbidity | 8.0 | | NTU | 0.10 | 0.10 | 1.0 | 180.1 |
| | Analysis Batch: 660-90879 | | Date Analyzed: 02/18/2010 0930 | | | | |
| Biochemical Oxygen Demand | 11.5 | Q | mg/L | 2.00 | 2.00 | 1.0 | 405.1 |
| | Analysis Batch: 660-91308 | | Date Analyzed: 02/23/2010 0830 | | | | |
| Chlorophyll a | 40.7 | Q | ug/L | 2.00 | 2.00 | 1.0 | SM 10200H |
| | Analysis Batch: 660-91277 | | Date Analyzed: 02/23/2010 1028 | | | | |
| Alkalinity | 540 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2320B |
| | Analysis Batch: 660-90996 | | Date Analyzed: 02/23/2010 1249 | | | | |
| Salinity | 2.0 | U | ppt | 2.0 | 2.0 | 1.0 | SM 2520B |
| | Analysis Batch: 660-91136 | | Date Analyzed: 02/25/2010 1200 | | | | |
| Total Suspended Solids | 8.0 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2540D |
| | Analysis Batch: 660-90872 | | Date Analyzed: 02/19/2010 1500 | | | | |
| Sulfide | 1.0 | U | mg/L | 1.0 | 1.0 | 1.0 | SM 4500 S2 F |
| | Analysis Batch: 660-90918 | | Date Analyzed: 02/19/2010 1600 | | | | |

# DATA REPORTING QUALIFIERS

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

| Lab Section | Qualifier | Description |
|---|---|---|
| GC VOA | | |
| | V | Indicates the analyte was detected in both the sample and the associated method blank. |
| | I | The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit. |
| GC Semi VOA | | |
| | J3 | Estimated value; value may not be accurate. Spike recovery or RPD outside of criteria. |
| | J1 | Estimated value; value may not be accurate. Surrogate recovery outside of criteria. |
| | U | Indicates that the compound was analyzed for but not detected. |
| | I | The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit. |
| Metals | | |
| | J3 | Estimated value; value may not be accurate. Spike recovery or RPD outside of criteria. |
| | U | Indicates that the compound was analyzed for but not detected. |
| | I | The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit. |
| General Chemistry | | |
| | J3 | Estimated value; value may not be accurate. Spike recovery or RPD outside of criteria. |
| | U | Indicates that the compound was analyzed for but not detected. |
| | Q | Sample held beyond the accepted holding time. |
| | I | The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit. |

### Method Blank - Batch: 400-104462

**Method: RSK-175**
**Preparation: N/A**

Lab Sample ID: MB 400-104462/1
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/26/2010 0808
Date Prepared: N/A

Analysis Batch: 400-104462
Prep Batch: N/A
Units: ug/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL
Injection Volume:

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Carbon dioxide (as CO2) | 8.00 | I | 7.0 | 50 |

### Lab Control Sample/
### Lab Control Sample Duplicate Recovery Report - Batch: 400-104462

**Method: RSK-175**
**Preparation: N/A**

LCS Lab Sample ID: LCS 400-104462/2
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/26/2010 0743
Date Prepared: N/A

Analysis Batch: 400-104462
Prep Batch: N/A
Units: ug/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL
Injection Volume:

LCSD Lab Sample ID: LCSD 400-104462/3
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/26/2010 0755
Date Prepared: N/A

Analysis Batch: 400-104462
Prep Batch: N/A
Units: ug/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL
Injection Volume:

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | LCS | LCSD | Limit | RPD | RPD Limit | LCS Qual | LCSD Qual |
| Carbon dioxide (as CO2) | 104 | 108 | 80 - 120 | 4 | 50 | | |

## Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Method Blank - Batch: 660-90901**

**Method: 8081A**
**Preparation: 3550B**

Lab Sample ID: MB 660-90901/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/25/2010 0349
Date Prepared: 02/22/2010 0654

Analysis Batch: 660-91299
Prep Batch: 660-90901
Units: ug/Kg

Instrument ID: BSGJ
Lab File ID: 1B24J035.D
Initial Weight/Volume: 30.00 g
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Column ID: PRIMARY

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| 4,4'-DDD | 0.50 | U | 0.50 | 3.3 |
| 4,4'-DDE | 0.50 | U | 0.50 | 3.3 |
| 4,4'-DDT | 0.50 | U | 0.50 | 3.3 |
| Aldrin | 0.50 | U | 0.50 | 2.0 |
| alpha-BHC | 0.14 | U | 0.14 | 1.7 |
| beta-BHC | 0.50 | U | 0.50 | 2.0 |
| Chlordane (technical) | 2.4 | U | 2.4 | 17 |
| delta-BHC | 0.50 | U | 0.50 | 2.0 |
| Dieldrin | 0.15 | U | 0.15 | 1.7 |
| Endosulfan I | 0.25 | U | 0.25 | 2.0 |
| Endosulfan II | 0.25 | U | 0.25 | 3.3 |
| Endosulfan sulfate | 0.25 | U | 0.25 | 3.3 |
| Endrin | 0.50 | U | 0.50 | 4.0 |
| Endrin aldehyde | 0.50 | U | 0.50 | 4.0 |
| Endrin ketone | 0.50 | U | 0.50 | 4.0 |
| gamma-BHC (Lindane) | 0.50 | U | 0.50 | 2.0 |
| Heptachlor | 0.50 | U | 0.50 | 2.0 |
| Heptachlor epoxide | 0.14 | U | 0.14 | 2.0 |
| Methoxychlor | 1.0 | U | 1.0 | 17 |
| Toxaphene | 29 | U | 29 | 170 |

| Surrogate | % Rec | Acceptance Limits |
|---|---|---|
| DCB Decachlorobiphenyl | 81 | 30 - 150 |
| Tetrachloro-m-xylene | 82 | 30 - 150 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Lab Control Sample - Batch: 660-90901**

**Method: 8081A**
**Preparation: 3550B**

Lab Sample ID: LCS 660-90901/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/25/2010 0403
Date Prepared: 02/22/2010 0654

Analysis Batch: 660-91299
Prep Batch: 660-90901
Units: ug/Kg

Instrument ID: BSGJ
Lab File ID: 1B24J036.D
Initial Weight/Volume: 30.00 g
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Column ID: PRIMARY

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| 4,4'-DDD | 16.7 | 15.1 | 91 | 62 - 130 | |
| 4,4'-DDE | 16.7 | 14.5 | 87 | 60 - 130 | |
| 4,4'-DDT | 16.7 | 15.2 | 91 | 35 - 142 | |
| Aldrin | 16.7 | 14.7 | 88 | 52 - 130 | |
| alpha-BHC | 16.7 | 14.8 | 89 | 58 - 130 | |
| beta-BHC | 16.7 | 14.9 | 89 | 56 - 130 | |
| delta-BHC | 16.7 | 15.8 | 95 | 48 - 130 | |
| Dieldrin | 16.7 | 14.3 | 86 | 60 - 130 | |
| Endosulfan I | 16.7 | 13.9 | 83 | 59 - 130 | |
| Endosulfan II | 16.7 | 14.2 | 85 | 60 - 130 | |
| Endosulfan sulfate | 16.7 | 15.5 | 93 | 49 - 130 | |
| Endrin | 16.7 | 14.5 | 87 | 57 - 130 | |
| Endrin aldehyde | 16.7 | 14.6 | 88 | 57 - 130 | |
| Endrin ketone | 16.7 | 16.4 | 98 | 42 - 136 | |
| gamma-BHC (Lindane) | 16.7 | 15.0 | 90 | 58 - 130 | |
| Heptachlor | 16.7 | 15.4 | 92 | 55 - 130 | |
| Heptachlor epoxide | 16.7 | 14.4 | 87 | 59 - 130 | |
| Methoxychlor | 16.7 | 16.4 | 98 | 37 - 133 | I |

| Surrogate | % Rec | Acceptance Limits |
|---|---|---|
| DCB Decachlorobiphenyl | 83 | 30 - 150 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

## Matrix Spike/ Matrix Spike Duplicate Recovery Report - Batch: 660-90901

**Method: 8081A**
**Preparation: 3550B**

MS Lab Sample ID: 660-33914-A-11-B MS
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/25/2010 0657
Date Prepared: 02/22/2010 0654

Analysis Batch: 660-91299
Prep Batch: 660-90901

Instrument ID: BSGJ
Lab File ID: 1B24J049.D
Initial Weight/Volume: 30.20 g
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Column ID: PRIMARY

MSD Lab Sample ID: 660-33914-A-11-C MSD
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/25/2010 0710
Date Prepared: 02/22/2010 0654

Analysis Batch: 660-91299
Prep Batch: 660-90901

Instrument ID: BSGJ
Lab File ID: 1B24J050.D
Initial Weight/Volume: 30.20 g
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Column ID: PRIMARY

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| 4,4'-DDD | 69 | 75 | 62 - 130 | 9 | 50 | | |
| 4,4'-DDE | 58 | 62 | 60 - 130 | 6 | 25 | J3 | |
| 4,4'-DDT | 4 | 4 | 35 - 142 | 0 | 26 | J3 | J3 |
| Aldrin | 58 | 64 | 52 - 130 | 9 | 38 | | |
| alpha-BHC | 70 | 73 | 58 - 130 | 3 | 40 | | |
| beta-BHC | 57 | 72 | 56 - 130 | 23 | 40 | | |
| delta-BHC | 81 | 90 | 48 - 130 | 10 | 47 | | |
| Dieldrin | 70 | 72 | 60 - 130 | 2 | 30 | | |
| Endosulfan I | 62 | 63 | 59 - 130 | 2 | 40 | | |
| Endosulfan II | 52 | 55 | 60 - 130 | 5 | 65 | J3 | J3 |
| Endosulfan sulfate | 52 | 55 | 49 - 130 | 6 | 50 | | |
| Endrin | 28 | 31 | 57 - 130 | 11 | 32 | J3 | J3 |
| Endrin aldehyde | 56 | 57 | 57 - 130 | 3 | 86 | J3 | |
| Endrin ketone | 17 | 19 | 42 - 136 | 15 | 31 | J3 | J3 |
| gamma-BHC (Lindane) | 45 | 53 | 58 - 130 | 16 | 37 | J3 | J3 |
| Heptachlor | 34 | 51 | 55 - 130 | 42 | 38 | J3 | J3 |
| Heptachlor epoxide | 57 | 58 | 59 - 130 | 2 | 40 | J3 | J3 |
| Methoxychlor | 0 | 7 | 37 - 133 | NC | 40 | J3 | J3 |

| Surrogate | MS % Rec | MSD % Rec | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 43 | 50 | 30 - 150 |

## Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Method Blank - Batch: 660-90902**

**Method: 8081A**
**Preparation: 3510C**

Lab Sample ID: MB 660-90902/1-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/23/2010 1225
Date Prepared: 02/22/2010 0737

Analysis Batch: 660-91104
Prep Batch: 660-90902
Units: ug/L

Instrument ID: BSGJ
Lab File ID: 1B23J016.D
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Column ID: PRIMARY

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| 4,4'-DDD | 0.0041 | U | 0.0041 | 0.010 |
| 4,4'-DDE | 0.0055 | U | 0.0055 | 0.010 |
| 4,4'-DDT | 0.0032 | U | 0.0032 | 0.010 |
| Aldrin | 0.0018 | U | 0.0018 | 0.010 |
| alpha-BHC | 0.0028 | U | 0.0028 | 0.010 |
| beta-BHC | 0.0027 | U | 0.0027 | 0.010 |
| Chlordane (technical) | 0.057 | U | 0.057 | 0.50 |
| delta-BHC | 0.0028 | U | 0.0028 | 0.010 |
| Dieldrin | 0.0014 | U | 0.0014 | 0.010 |
| Endosulfan I | 0.0034 | U | 0.0034 | 0.010 |
| Endosulfan II | 0.0033 | U | 0.0033 | 0.010 |
| Endosulfan sulfate | 0.0030 | U | 0.0030 | 0.010 |
| Endrin | 0.0031 | U | 0.0031 | 0.010 |
| Endrin aldehyde | 0.0032 | U | 0.0032 | 0.010 |
| Endrin ketone | 0.0054 | U | 0.0054 | 0.10 |
| gamma-BHC (Lindane) | 0.0026 | U | 0.0026 | 0.010 |
| Heptachlor | 0.0031 | U | 0.0031 | 0.010 |
| Heptachlor epoxide | 0.0031 | U | 0.0031 | 0.010 |
| Methoxychlor | 0.0051 | U | 0.0051 | 0.010 |
| Toxaphene | 0.72 | U | 0.72 | 3.0 |

| Surrogate | % Rec | Acceptance Limits |
|---|---|---|
| DCB Decachlorobiphenyl | 73 | 30 - 150 |
| Tetrachloro-m-xylene | 58 | 30 - 150 |

### Lab Control Sample - Batch: 660-90902

**Method: 8081A**
**Preparation: 3510C**

Lab Sample ID: LCS 660-90902/2-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/23/2010 1238
Date Prepared: 02/22/2010 0737

Analysis Batch: 660-91104
Prep Batch: 660-90902
Units: ug/L

Instrument ID: BSGJ
Lab File ID: 1B23J017.D
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Column ID: PRIMARY

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| 4,4'-DDD | 0.500 | 0.407 | 81 | 37 - 139 | |
| 4,4'-DDE | 0.500 | 0.407 | 81 | 39 - 130 | |
| 4,4'-DDT | 0.500 | 0.400 | 80 | 46 - 130 | |
| Aldrin | 0.500 | 0.332 | 66 | 31 - 130 | |
| alpha-BHC | 0.500 | 0.396 | 79 | 48 - 130 | |
| beta-BHC | 0.500 | 0.401 | 80 | 41 - 130 | |
| delta-BHC | 0.500 | 0.338 | 68 | 42 - 130 | |
| Dieldrin | 0.500 | 0.391 | 78 | 51 - 130 | |
| Endosulfan I | 0.500 | 0.383 | 77 | 40 - 130 | |
| Endosulfan II | 0.500 | 0.387 | 77 | 41 - 130 | |
| Endosulfan sulfate | 0.500 | 0.377 | 75 | 33 - 142 | |
| Endrin | 0.500 | 0.376 | 75 | 49 - 130 | |
| Endrin aldehyde | 0.500 | 0.367 | 73 | 34 - 132 | |
| Endrin ketone | 0.500 | 0.401 | 80 | 26 - 144 | |
| gamma-BHC (Lindane) | 0.500 | 0.390 | 78 | 53 - 130 | |
| Heptachlor | 0.500 | 0.349 | 70 | 36 - 130 | |
| Heptachlor epoxide | 0.500 | 0.381 | 76 | 41 - 130 | |
| Methoxychlor | 0.500 | 0.397 | 79 | 45 - 130 | |

| Surrogate | % Rec | Acceptance Limits |
|---|---|---|
| DCB Decachlorobiphenyl | 74 | 30 - 150 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Matrix Spike/**
**Matrix Spike Duplicate Recovery Report - Batch: 660-90902**

**Method: 8081A**
**Preparation: 3510C**

MS Lab Sample ID: 660-33904-A-2-B MS
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/23/2010 1318
Date Prepared: 02/22/2010 0737

Analysis Batch: 660-91104
Prep Batch: 660-90902

Instrument ID: BSGJ
Lab File ID: 1B23J020.D
Initial Weight/Volume: 1040 mL
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Column ID: PRIMARY

MSD Lab Sample ID: 660-33904-A-2-C MSD
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/23/2010 1332
Date Prepared: 02/22/2010 0737

Analysis Batch: 660-91104
Prep Batch: 660-90902

Instrument ID: BSGJ
Lab File ID: 1B23J021.D
Initial Weight/Volume: 1040 mL
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Column ID: PRIMARY

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| 4,4'-DDD | 88 | 82 | 37 - 139 | 7 | 39 | | |
| 4,4'-DDE | 82 | 77 | 39 - 130 | 6 | 18 | | |
| 4,4'-DDT | 236 | 218 | 46 - 130 | 8 | 27 | J3 | J3 |
| Aldrin | 63 | 58 | 31 - 130 | 8 | 25 | | |
| alpha-BHC | 77 | 70 | 48 - 130 | 7 | 30 | | |
| beta-BHC | 77 | 71 | 41 - 130 | 6 | 35 | | |
| delta-BHC | 69 | 65 | 42 - 130 | 5 | 41 | | |
| Dieldrin | 77 | 72 | 51 - 130 | 7 | 42 | | |
| Endosulfan I | 73 | 68 | 40 - 130 | 8 | 24 | | |
| Endosulfan II | 76 | 71 | 41 - 130 | 7 | 22 | | |
| Endosulfan sulfate | 72 | 68 | 33 - 142 | 5 | 28 | | |
| Endrin | 108 | 102 | 49 - 130 | 6 | 25 | | |
| Endrin aldehyde | 69 | 64 | 34 - 132 | 8 | 34 | | |
| Endrin ketone | 78 | 74 | 26 - 144 | 5 | 25 | | |
| gamma-BHC (Lindane) | 72 | 67 | 53 - 130 | 7 | 26 | | |
| Heptachlor | 69 | 65 | 36 - 130 | 6 | 26 | | |
| Heptachlor epoxide | 70 | 64 | 41 - 130 | 7 | 31 | | |
| Methoxychlor | 101 | 89 | 45 - 130 | 12 | 43 | | |

| Surrogate | MS % Rec | MSD % Rec | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 54 | 50 | 30 - 150 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Method Blank - Batch: 640-65814**

**Method: 8141A**
**Preparation: 3520C**

Lab Sample ID: MB 640-65814/1-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/23/2010 1715
Date Prepared: 02/19/2010 1415

Analysis Batch: 640-65935
Prep Batch: 640-65814
Units: ug/L

Instrument ID: SGF
Lab File ID: 1B23F36.d
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 5.0 mL
Injection Volume: 1 uL
Column ID: PRIMARY

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Azinphos-methyl | 0.33 | U | 0.33 | 1.0 |
| Bolstar | 0.095 | U | 0.095 | 1.0 |
| Chlorpyrifos | 0.11 | U | 0.11 | 1.0 |
| Coumaphos | 0.081 | U | 0.081 | 1.0 |
| Demeton, Total | 0.15 | U | 0.15 | 2.5 |
| Diazinon | 0.11 | U | 0.11 | 1.0 |
| Dichlorvos | 0.26 | U | 0.26 | 2.0 |
| Dimethoate | 0.32 | U | 0.32 | 2.0 |
| Disulfoton | 0.12 | U | 0.12 | 2.0 |
| EPN | 0.071 | U | 0.071 | 1.0 |
| Ethoprop | 0.41 | U | 0.41 | 0.50 |
| Fensulfothion | 0.17 | U | 0.17 | 5.0 |
| Hexazinone | 0.16 | U | 0.16 | 2.0 |
| Hexazinone | 0.16 | U | 0.16 | 2.0 |
| Malathion | 0.092 | U | 0.092 | 1.0 |
| Merphos | 0.13 | U | 0.13 | 1.0 |
| Mevinphos | 0.15 | U | 0.15 | 2.0 |
| Ethyl Parathion | 0.080 | U | 0.080 | 1.0 |
| Monochrotophos | 2.6 | U | 2.6 | 10 |
| Methyl parathion | 0.12 | U | 0.12 | 0.50 |
| Naled | 0.36 | U | 0.36 | 5.0 |
| Phorate | 0.16 | U | 0.16 | 1.0 |
| Ronnel | 0.13 | U | 0.13 | 1.0 |
| Stirophos | 0.084 | U | 0.084 | 1.0 |
| Sulfotepp | 0.055 | U | 0.055 | 0.50 |
| Tokuthion | 0.087 | U | 0.087 | 1.0 |
| Trichloronate | 0.11 | U | 0.11 | 1.0 |

| Surrogate | % Rec | Acceptance Limits |
|---|---|---|
| Triphenylphosphate | 105 | 37 - 139 |

**Lab Control Sample - Batch: 640-65814**

**Method: 8141A**
**Preparation: 3520C**

Lab Sample ID: LCS 640-65814/2-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/23/2010 2130
Date Prepared: 02/19/2010 1415

Analysis Batch: 640-65935
Prep Batch: 640-65814
Units: ug/L

Instrument ID: SGF
Lab File ID: 2B23F54.d
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 5.0 mL
Injection Volume: 1 uL
Column ID: PRIMARY

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Azinphos-methyl | 2.50 | 2.33 | 93 | 50 - 130 | |
| Bolstar | 2.50 | 2.36 | 94 | 50 - 130 | |
| Chlorpyrifos | 2.50 | 2.53 | 101 | 50 - 130 | |
| Coumaphos | 2.50 | 2.82 | 113 | 50 - 130 | |
| Demeton, Total | 5.00 | 3.66 | 73 | | |
| Diazinon | 2.50 | 2.61 | 105 | 42 - 132 | |
| Dichlorvos | 2.50 | 2.77 | 111 | 50 - 130 | |
| EPN | 2.50 | 2.94 | 118 | 50 - 130 | |
| Ethoprop | 2.50 | 2.64 | 106 | 50 - 130 | |
| Fensulfothion | 2.50 | 2.59 | 104 | 50 - 130 | I |
| Malathion | 2.50 | 2.60 | 104 | 50 - 130 | |
| Mevinphos | 2.50 | 2.64 | 106 | 50 - 130 | |
| Ethyl Parathion | 2.50 | 2.70 | 108 | 49 - 134 | |
| Monochrotophos | 10.0 | 4.15 | 41 | 50 - 130 | I J3 |
| Methyl parathion | 2.50 | 2.70 | 108 | 43 - 140 | |
| Naled | 10.0 | 8.84 | 88 | 50 - 130 | |
| Phorate | 2.50 | 2.37 | 95 | 50 - 130 | |
| Ronnel | 2.50 | 2.28 | 91 | 38 - 124 | |
| Stirophos | 2.50 | 2.60 | 104 | 50 - 130 | |
| Tokuthion | 2.50 | 2.53 | 101 | 50 - 130 | |
| Trichloronate | 2.50 | 2.62 | 105 | 50 - 130 | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Method Blank - Batch: 640-65855**

**Method: 8141A**
**Preparation: 3550B**

Lab Sample ID: MB 640-65855/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/24/2010 0831
Date Prepared: 02/22/2010 1006

Analysis Batch: 640-65935
Prep Batch: 640-65855
Units: ug/Kg

Instrument ID: SGF
Lab File ID: 1B23F63.d
Initial Weight/Volume: 00030.24 g
Final Weight/Volume: 10.0 mL
Injection Volume: 1 uL
Column ID: PRIMARY

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Azinphos-methyl | 4.4 | U | 4.4 | 65 |
| Bolstar | 8.4 | U | 8.4 | 33 |
| Chlorpyrifos | 8.3 | U | 8.3 | 33 |
| Coumaphos | 8.5 | U | 8.5 | 330 |
| Demeton, Total | 13 | U | 13 | 82 |
| Diazinon | 8.7 | U | 8.7 | 33 |
| Dichlorvos | 17 | U | 17 | 65 |
| Dimethoate | 9.9 | U | 9.9 | 65 |
| Disulfoton | 11 | U | 11 | 65 |
| EPN | 9.0 | U | 9.0 | 33 |
| Ethoprop | 15 | U | 15 | 17 |
| Fensulfothion | 9.9 | U | 9.9 | 330 |
| Hexazinone | 7.6 | U | 7.6 | 33 |
| Hexazinone | 7.6 | U | 7.6 | 33 |
| Malathion | 8.9 | U | 8.9 | 33 |
| Merphos | 8.2 | U | 8.2 | 33 |
| Mevinphos | 11 | U | 11 | 65 |
| Ethyl Parathion | 8.7 | U | 8.7 | 33 |
| Monochrotophos | 84 | U | 84 | 330 |
| Methyl parathion | 5.4 | U | 5.4 | 17 |
| Naled | 5.2 | U | 5.2 | 330 |
| Phorate | 11 | U | 11 | 33 |
| Ronnel | 7.9 | U | 7.9 | 33 |
| Stirophos | 8.8 | U | 8.8 | 33 |
| Sulfotepp | 5.3 | U | 5.3 | 17 |
| Tokuthion | 7.6 | U | 7.6 | 33 |
| Trichloronate | 8.1 | U | 8.1 | 330 |

| Surrogate | % Rec | Acceptance Limits |
|---|---|---|
| Triphenylphosphate | 94 | 35 - 134 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Lab Control Sample/**
**Lab Control Sample Duplicate Recovery Report - Batch: 640-65855**

**Method: 8141A**
**Preparation: 3550B**

LCS Lab Sample ID: LCS 640-65855/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/24/2010 1004
Date Prepared: 02/22/2010 1006

Analysis Batch: 640-65935
Prep Batch: 640-65855
Units: ug/Kg

Instrument ID: SGF
Lab File ID: 1B23F69.d
Initial Weight/Volume: 00030.07 g
Final Weight/Volume: 10.0 mL
Injection Volume: 1 uL
Column ID: PRIMARY

LCSD Lab Sample ID: LCSD 640-65855/3-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/24/2010 1018
Date Prepared: 02/22/2010 1006

Analysis Batch: 640-65935
Prep Batch: 640-65855
Units: ug/Kg

Instrument ID: SGF
Lab File ID: 1B23F70.d
Initial Weight/Volume: 00030.36 g
Final Weight/Volume: 10.0 mL
Injection Volume: 1 uL
Column ID: PRIMARY

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | LCS | LCSD | Limit | RPD | RPD Limit | LCS Qual | LCSD Qual |
| Azinphos-methyl | 102 | 105 | 50 - 130 | 2 | 50 | | |
| Bolstar | 74 | 80 | 50 - 130 | 1 | 50 | | |
| Chlorpyrifos | 70 | 76 | 31 - 130 | 7 | 50 | | |
| Coumaphos | 87 | 88 | 50 - 130 | 1 | 50 | I | I |
| Demeton, Total | 65 | 70 | | 7 | | | |
| Diazinon | 68 | 73 | 20 - 100 | 6 | 50 | | |
| Dichlorvos | 76 | 82 | 50 - 130 | 7 | 50 | | |
| EPN | 103 | 109 | 50 - 130 | 4 | 50 | | |
| Ethoprop | 68 | 75 | 50 - 130 | 8 | 50 | | |
| Fensulfothion | 102 | 107 | 50 - 130 | 4 | 50 | I | I |
| Malathion | 72 | 77 | 50 - 130 | 6 | 50 | | |
| Mevinphos | 72 | 78 | 50 - 130 | 4 | 50 | | |
| Ethyl Parathion | 80 | 87 | 22 - 116 | 8 | 50 | | |
| Monochrotophos | 70 | 76 | 50 - 130 | 8 | 50 | | |
| Methyl parathion | 79 | 84 | 20 - 107 | 3 | 50 | | |
| Naled | 53 | 53 | 50 - 130 | 1 | 50 | | |
| Phorate | 66 | 72 | 50 - 130 | 0 | 50 | | |
| Ronnel | 69 | 74 | 38 - 130 | 6 | 50 | | |
| Stirophos | 79 | 85 | 50 - 130 | 2 | 50 | | |
| Tokuthion | 71 | 78 | 50 - 130 | 9 | 50 | | |
| Trichloronate | 68 | 75 | 50 - 130 | 1 | 50 | I | I |

## Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Matrix Spike/**
**Matrix Spike Duplicate Recovery Report - Batch: 640-65855**

**Method: 8141A**
**Preparation: 3550B**

| | | | | | |
|---|---|---|---|---|---|
| MS Lab Sample ID: | 400-45631-C-1-A MS | Analysis Batch: | 640-65935 | Instrument ID: | SGF |
| Client Matrix: | Solid | Prep Batch: | 640-65855 | Lab File ID: | 1B23F67.d |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 00030.26 g |
| Date Analyzed: | 02/24/2010 0936 | | | Final Weight/Volume: | 10.0 mL |
| Date Prepared: | 02/22/2010 1006 | | | Injection Volume: | 1 uL |
| | | | | Column ID: | PRIMARY |

| | | | | | |
|---|---|---|---|---|---|
| MSD Lab Sample ID: | 400-45631-C-1-B MSD | Analysis Batch: | 640-65935 | Instrument ID: | SGF |
| Client Matrix: | Solid | Prep Batch: | 640-65855 | Lab File ID: | 1B23F68.d |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 00030.25 g |
| Date Analyzed: | 02/24/2010 0950 | | | Final Weight/Volume: | 10.0 mL |
| Date Prepared: | 02/22/2010 1006 | | | Injection Volume: | 1 uL |
| | | | | Column ID: | PRIMARY |

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Azinphos-methyl | 94 | 61 | 50 - 130 | 42 | 50 | | |
| Bolstar | 74 | 58 | 50 - 130 | 34 | 50 | | |
| Chlorpyrifos | 70 | 55 | 31 - 130 | 23 | 50 | | |
| Coumaphos | 93 | 64 | 50 - 130 | 37 | 50 | I | I |
| Demeton, Total | 52 | 35 | 50 - 130 | 38 | | | J3 |
| Diazinon | 62 | 46 | 20 - 100 | 29 | 50 | | |
| Dichlorvos | 56 | 36 | 50 - 130 | 44 | 50 | | I J3 |
| EPN | 106 | 78 | 50 - 130 | 31 | 50 | | |
| Ethoprop | 57 | 40 | 50 - 130 | 35 | 50 | | J3 |
| Fensulfothion | 58 | 55 | 50 - 130 | 6 | 50 | I | I |
| Malathion | 69 | 46 | 50 - 130 | 40 | 50 | | J3 |
| Mevinphos | 23 | 24 | 50 - 130 | 4 | 50 | I J3 | I J3 |
| Ethyl Parathion | 80 | 56 | 22 - 116 | 35 | 50 | | |
| Monochrotophos | 0 | 0 | 50 - 130 | NC | 50 | U J3 | U J3 |
| Methyl parathion | 72 | 49 | 20 - 107 | 43 | 50 | | |
| Naled | 36 | 20 | 50 - 130 | 63 | 50 | I J3 | I J3 |
| Phorate | 56 | 40 | 50 - 130 | 40 | 50 | | J3 |
| Ronnel | 67 | 51 | 38 - 130 | 26 | 50 | | |
| Stirophos | 76 | 52 | 50 - 130 | 38 | 50 | | |
| Tokuthion | 70 | 58 | 50 - 130 | 18 | 50 | | |
| Trichloronate | 67 | 55 | 50 - 130 | 25 | 50 | I | I |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Method Blank - Batch: 660-90999**

**Method: 8151A**
**Preparation: 8151A**

Lab Sample ID: MB 660-90999/1-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/05/2010 0144
Date Prepared: 02/23/2010 1625

Analysis Batch: 660-91479
Prep Batch: 660-90999
Units: ug/L

Instrument ID: BSGJ
Lab File ID: 1C04J031.D
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Column ID: PRIMARY

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| 2,4,5-T | 1.0 | U | 1.0 | 5.0 |
| 2,4-D | 1.0 | U | 1.0 | 5.0 |
| 2,4-DB | 1.0 | U | 1.0 | 5.0 |
| Dalapon | 25 | U | 25 | 120 |
| Dicamba | 0.25 | U | 0.25 | 1.2 |
| Dichlorprop | 1.0 | U | 1.0 | 6.0 |
| Dinoseb | 1.0 | U | 1.0 | 6.0 |
| MCPA | 34 | U | 34 | 120 |
| MCPP | 35 | U | 35 | 120 |
| Pentachlorophenol | 0.085 | U | 0.085 | 1.0 |
| Picloram | 1.0 | U | 1.0 | 5.0 |
| Silvex (2,4,5-TP) | 1.0 | U | 1.0 | 5.0 |

| Surrogate | % Rec | Acceptance Limits |
|---|---|---|
| 2,4-Dichlorophenylacetic acid | 59 | 33 - 120 |

**Lab Control Sample/**
**Lab Control Sample Duplicate Recovery Report - Batch: 660-90999**

**Method: 8151A**
**Preparation: 8151A**

LCS Lab Sample ID: LCS 660-90999/2-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/05/2010 0202
Date Prepared: 02/23/2010 1625

Analysis Batch: 660-91479
Prep Batch: 660-90999
Units: ug/L

Instrument ID: BSGJ
Lab File ID: 1C04J032.D
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Column ID: PRIMARY

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LCSD Lab Sample ID: LCSD 660-90999/3-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/05/2010 0219
Date Prepared: 02/23/2010 1625

Analysis Batch: 660-91479
Prep Batch: 660-90999
Units: ug/L

Instrument ID: BSGJ
Lab File ID: 1C04J033.D
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Column ID: PRIMARY

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | LCS | LCSD | Limit | RPD | RPD Limit | LCS Qual | LCSD Qual |
| 2,4,5-T | 106 | 101 | 50 - 130 | 5 | 48 | | |
| 2,4-D | 114 | 104 | 60 - 130 | 9 | 78 | | |
| 2,4-DB | 153 | 141 | 10 - 181 | 8 | 43 | | |
| Dalapon | 21 | 70 | 10 - 228 | 107 | 68 | | J3 |
| Dicamba | 88 | 85 | 24 - 150 | 4 | 46 | | |
| Dichlorprop | 84 | 78 | 13 - 130 | 7 | 95 | | |
| Dinoseb | 37 | 14 | 10 - 130 | 94 | 115 | | |
| MCPA | 458 | 369 | 10 - 158 | 21 | 28 | J3 | J3 |
| MCPP | 88 | 78 | 10 - 214 | 12 | 78 | | |
| Pentachlorophenol | 67 | 64 | 25 - 134 | 6 | 34 | | |
| Picloram | 112 | 105 | 10 - 150 | 7 | 56 | | |
| Silvex (2,4,5-TP) | 100 | 96 | 33 - 130 | 5 | 66 | | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Method Blank - Batch: 660-91293**

**Method: 8151A**
**Preparation: 8151A**

Lab Sample ID: MB 660-91293/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/07/2010 1518
Date Prepared: 03/02/2010 1410

Analysis Batch: 660-91563
Prep Batch: 660-91293
Units: ug/Kg

Instrument ID: BSGJ
Lab File ID: 1C07J012.D
Initial Weight/Volume: 30.00 g
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Column ID: PRIMARY

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| 2,4,5-T | 10 | U | 10 | 50 |
| 2,4-D | 1.6 | U | 1.6 | 8.3 |
| 2,4-DB | 6.4 | U | 6.4 | 8.3 |
| Dalapon | 23 | U | 23 | 2000 |
| Dicamba | 12 | U | 12 | 50 |
| Dichlorprop | 25 | U | 25 | 100 |
| Dinoseb | 8.3 | U | 8.3 | 30 |
| MCPA | 740 | U | 740 | 2000 |
| MCPP | 400 | U | 400 | 2000 |
| Pentachlorophenol | 5.0 | U | 5.0 | 17 |
| Picloram | 1.2 | U | 1.2 | 3.3 |
| Silvex (2,4,5-TP) | 10 | U | 10 | 50 |

| Surrogate | % Rec | Acceptance Limits |
|---|---|---|
| 2,4-Dichlorophenylacetic acid | 59 | 10 - 135 |

**Lab Control Sample - Batch: 660-91293**

**Method: 8151A**
**Preparation: 8151A**

Lab Sample ID: LCS 660-91293/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/07/2010 1535
Date Prepared: 03/02/2010 1410

Analysis Batch: 660-91563
Prep Batch: 660-91293
Units: ug/Kg

Instrument ID: BSGJ
Lab File ID: 1C07J013.D
Initial Weight/Volume: 30.00 g
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Column ID: PRIMARY

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| 2,4,5-T | 83.3 | 41.4 | 50 | 27 - 168 | |
| 2,4-D | 83.3 | 31.7 | 38 | 26 - 159 | |
| 2,4-DB | 83.3 | 57.9 | 69 | 10 - 181 | |
| Dalapon | 83.3 | 90.3 | 108 | 10 - 213 | |
| Dicamba | 83.3 | 78.2 | 94 | 29 - 145 | |
| Dichlorprop | 83.3 | 58.9 | 71 | 28 - 130 | |
| Dinoseb | 83.3 | 8.3 | 5 | 10 - 130 | J3 |
| MCPA | 8330 | 3190 | 38 | 29 - 134 | |
| MCPP | 8330 | 4830 | 58 | 13 - 157 | |
| Pentachlorophenol | 83.3 | 51.5 | 62 | 16 - 132 | |
| Picloram | 83.3 | 72.9 | 88 | 10 - 150 | |
| Silvex (2,4,5-TP) | 83.3 | 54.5 | 65 | 32 - 134 | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Matrix Spike/**
**Matrix Spike Duplicate Recovery Report - Batch: 660-91293**

**Method: 8151A**
**Preparation: 8151A**

| | | | | | |
|---|---|---|---|---|---|
| MS Lab Sample ID: | 660-33914-A-11-F MS | Analysis Batch: | 660-91563 | Instrument ID: | BSGJ |
| Client Matrix: | Solid | Prep Batch: | 660-91293 | Lab File ID: | 1C08J020.D |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 29.58 g |
| Date Analyzed: | 03/08/2010 2215 | | | Final Weight/Volume: | 10 mL |
| Date Prepared: | 03/02/2010 1410 | | | Injection Volume: | 2 uL |
| | | | | Column ID: | PRIMARY |

| | | | | | |
|---|---|---|---|---|---|
| MSD Lab Sample ID: | 660-33914-A-11-G MSD | Analysis Batch: | 660-91563 | Instrument ID: | BSGJ |
| Client Matrix: | Solid | Prep Batch: | 660-91293 | Lab File ID: | 1C08J021.D |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 29.58 g |
| Date Analyzed: | 03/08/2010 2233 | | | Final Weight/Volume: | 10 mL |
| Date Prepared: | 03/02/2010 1410 | | | Injection Volume: | 2 uL |
| | | | | Column ID: | PRIMARY |

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| 2,4,5-T | 110 | 110 | 27 - 168 | 0 | 59 | | |
| 2,4-D | 93 | 91 | 26 - 159 | 3 | 47 | | |
| 2,4-DB | 175 | 191 | 10 - 181 | 9 | 40 | | J3 |
| Dalapon | 0 | 0 | 10 - 213 | NC | 40 | J3 | J3 |
| Dicamba | 99 | 106 | 29 - 145 | 7 | 40 | | |
| Dichlorprop | 103 | 117 | 28 - 130 | 12 | 40 | | |
| Dinoseb | 117 | 143 | 10 - 130 | 20 | 50 | | J3 |
| MCPA | 102 | 107 | 29 - 134 | 5 | 50 | | |
| MCPP | 111 | 134 | 13 - 157 | 19 | 50 | | |
| Pentachlorophenol | 118 | 147 | 16 - 132 | 22 | 40 | | J3 |
| Picloram | 18 | 17 | 10 - 150 | 10 | 40 | | |
| Silvex (2,4,5-TP) | 154 | 178 | 32 - 134 | 14 | 51 | J3 | J3 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Method Blank - Batch: 660-90828**

**Method: 6010B**
**Preparation: 3050B**

Lab Sample ID: MB 660-90828/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/19/2010 1520
Date Prepared: 02/18/2010 1533

Analysis Batch: 660-90852
Prep Batch: 660-90828
Units: mg/Kg

Instrument ID: ICPA
Lab File ID: 10B19A
Initial Weight/Volume: 1.00 g
Final Weight/Volume: 50 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Aluminum | 5.8 | U | 5.8 | 20 |
| Arsenic | 0.23 | U | 0.23 | 0.50 |
| Boron | 0.59 | U | 0.59 | 5.0 |
| Barium | 0.16 | U | 0.16 | 1.0 |
| Calcium | 15 | U | 15 | 50 |
| Cadmium | 0.087 | U | 0.087 | 0.50 |
| Cobalt | 0.19 | U | 0.19 | 1.0 |
| Chromium | 0.17 | U | 0.17 | 1.0 |
| Copper | 0.50 | U | 0.50 | 2.0 |
| Iron | 3.0 | U | 3.0 | 5.0 |
| Magnesium | 6.8 | U | 6.8 | 50 |
| Manganese | 0.21 | U | 0.21 | 1.0 |
| Sodium | 18 | U | 18 | 50 |
| Lead | 0.15 | U | 0.15 | 0.50 |
| Strontium | 0.098 | U | 0.098 | 1.0 |
| Titanium | 0.30 | U | 0.30 | 1.0 |
| Vanadium | 0.11 | U | 0.11 | 1.0 |
| Zinc | 0.50 | U | 0.50 | 2.0 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Lab Control Sample - Batch: 660-90828**

**Method: 6010B**
**Preparation: 3050B**

Lab Sample ID: LCS 660-90828/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/19/2010 1526
Date Prepared: 02/18/2010 1533

Analysis Batch: 660-90852
Prep Batch: 660-90828
Units: mg/Kg

Instrument ID: ICPA
Lab File ID: 10B19A
Initial Weight/Volume: 1.00 g
Final Weight/Volume: 50 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Aluminum | 50.0 | 48.6 | 97 | 75 - 125 | |
| Arsenic | 50.0 | 50.1 | 100 | 75 - 125 | |
| Boron | 50.0 | 48.5 | 97 | 75 - 125 | |
| Barium | 50.0 | 50.1 | 100 | 75 - 125 | |
| Calcium | 50.0 | 53.2 | 106 | 75 - 125 | |
| Cadmium | 50.0 | 52.8 | 106 | 75 - 125 | |
| Cobalt | 50.0 | 49.6 | 99 | 75 - 125 | |
| Chromium | 49.5 | 49.8 | 101 | 75 - 125 | |
| Copper | 50.0 | 49.8 | 100 | 75 - 125 | |
| Iron | 50.0 | 51.0 | 102 | 75 - 125 | |
| Magnesium | 50.0 | 48.9 | 98 | 75 - 125 | |
| Manganese | 50.0 | 51.9 | 104 | 75 - 125 | |
| Sodium | 500 | 495 | 99 | 75 - 125 | |
| Lead | 50.0 | 52.1 | 104 | 75 - 125 | |
| Strontium | 50.0 | 51.5 | 103 | 75 - 125 | |
| Titanium | 50.0 | 50.7 | 101 | 75 - 125 | |
| Vanadium | 50.0 | 49.9 | 100 | 75 - 125 | |
| Zinc | 50.0 | 51.5 | 103 | 75 - 125 | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Matrix Spike/**
**Matrix Spike Duplicate Recovery Report - Batch: 660-90828**

**Method: 6010B**
**Preparation: 3050B**

MS Lab Sample ID: 660-33889-B-1-B MS
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/19/2010 1544
Date Prepared: 02/18/2010 1533

Analysis Batch: 660-90852
Prep Batch: 660-90828

Instrument ID: ICPA
Lab File ID: 10B19A
Initial Weight/Volume: 1.03 g
Final Weight/Volume: 50 mL

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MSD Lab Sample ID: 660-33889-B-1-C MSD
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/19/2010 1550
Date Prepared: 02/18/2010 1533

Analysis Batch: 660-90852
Prep Batch: 660-90828

Instrument ID: ICPA
Lab File ID: 10B19A
Initial Weight/Volume: 1.00 g
Final Weight/Volume: 50 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Aluminum | 153 | 490 | 75 - 125 | 8 | 20 | J3 | J3 |
| Arsenic | 78 | 76 | 75 - 125 | 1 | 20 | | |
| Boron | 76 | 75 | 75 - 125 | 2 | 20 | | |
| Barium | 78 | 79 | 75 - 125 | 3 | 20 | | |
| Calcium | -2840 | 1750 | 75 - 125 | 8 | 20 | J3 | J3 |
| Cadmium | 77 | 75 | 75 - 125 | 0 | 20 | | |
| Cobalt | 73 | 71 | 75 - 125 | 0 | 20 | J3 | J3 |
| Chromium | 73 | 73 | 75 - 125 | 2 | 20 | J3 | J3 |
| Copper | 79 | 78 | 75 - 125 | 2 | 20 | | |
| Iron | -91 | 107 | 75 - 125 | 10 | 20 | J3 | |
| Magnesium | 53 | 62 | 75 - 125 | 3 | 20 | J3 | J3 |
| Manganese | 75 | 76 | 75 - 125 | 3 | 20 | | |
| Sodium | 81 | 86 | 75 - 125 | 5 | 20 | | |
| Lead | 77 | 76 | 75 - 125 | 1 | 20 | | |
| Strontium | 71 | 80 | 75 - 125 | 5 | 20 | J3 | |
| Titanium | 74 | 78 | 75 - 125 | 5 | 20 | J3 | |
| Vanadium | 75 | 75 | 75 - 125 | 2 | 20 | | |
| Zinc | 72 | 71 | 75 - 125 | 2 | 20 | J3 | J3 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Method Blank - Batch: 660-91336**

**Method: 6010B**
**Preparation: 3005A**
**Total Recoverable**

Lab Sample ID: MB 660-91336/1-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/04/2010 1433
Date Prepared: 03/03/2010 1132

Analysis Batch: 660-91401
Prep Batch: 660-91336
Units: mg/L

Instrument ID: ICPA
Lab File ID: 10C04A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Aluminum | 0.050 | U | 0.050 | 0.20 |
| Arsenic | 0.0040 | U | 0.0040 | 0.010 |
| Boron | 0.010 | U | 0.010 | 0.050 |
| Potassium | 0.19 | U | 0.19 | 1.0 |
| Barium | 0.0020 | U | 0.0020 | 0.010 |
| Calcium | 0.10 | U | 0.10 | 0.50 |
| Cadmium | 0.0010 | U | 0.0010 | 0.0040 |
| Cobalt | 0.0020 | U | 0.0020 | 0.010 |
| Chromium | 0.0020 | U | 0.0020 | 0.010 |
| Copper | 0.0029 | U | 0.0029 | 0.010 |
| Iron | 0.050 | U | 0.050 | 0.20 |
| Magnesium | 0.020 | U | 0.020 | 0.080 |
| Manganese | 0.0010 | U | 0.0010 | 0.0040 |
| Sodium | 0.31 | U | 0.31 | 0.50 |
| Lead | 0.0020 | U | 0.0020 | 0.010 |
| Strontium | 0.0010 | U | 0.0010 | 0.0050 |
| Titanium | 0.0020 | U | 0.0020 | 0.010 |
| Vanadium | 0.0025 | U | 0.0025 | 0.010 |
| Zinc | 0.0050 | U | 0.0050 | 0.020 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Lab Control Sample - Batch: 660-91336**

**Method: 6010B**
**Preparation: 3005A**
**Total Recoverable**

Lab Sample ID: LCS 660-91336/2-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/04/2010 1439
Date Prepared: 03/03/2010 1132

Analysis Batch: 660-91401
Prep Batch: 660-91336
Units: mg/L

Instrument ID: ICPA
Lab File ID: 10C04A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Aluminum | 1.00 | 0.966 | 97 | 75 - 125 | |
| Arsenic | 1.00 | 0.969 | 97 | 75 - 125 | |
| Boron | 1.00 | 0.963 | 96 | 75 - 125 | |
| Potassium | 10.0 | 9.38 | 94 | 75 - 125 | |
| Barium | 1.00 | 1.00 | 100 | 75 - 125 | |
| Calcium | 1.00 | 0.968 | 97 | 75 - 125 | |
| Cadmium | 1.00 | 0.969 | 97 | 75 - 125 | |
| Cobalt | 1.00 | 0.926 | 93 | 75 - 125 | |
| Chromium | 0.990 | 0.945 | 95 | 75 - 125 | |
| Copper | 1.00 | 1.01 | 101 | 75 - 125 | |
| Iron | 1.00 | 0.969 | 97 | 75 - 125 | |
| Magnesium | 1.00 | 0.939 | 94 | 75 - 125 | |
| Manganese | 1.00 | 0.982 | 98 | 75 - 125 | |
| Sodium | 10.0 | 10.3 | 103 | 75 - 125 | |
| Lead | 1.00 | 0.969 | 97 | 75 - 125 | |
| Strontium | 1.00 | 1.02 | 102 | 75 - 125 | |
| Titanium | 1.00 | 0.999 | 100 | 75 - 125 | |
| Vanadium | 1.00 | 0.970 | 97 | 75 - 125 | |
| Zinc | 1.00 | 0.926 | 93 | 75 - 125 | |

**Matrix Spike/**
**Matrix Spike Duplicate Recovery Report - Batch: 660-91336**

**Method: 6010B**
**Preparation: 3005A**
**Total Recoverable**

MS Lab Sample ID: 660-33998-F-1-B MS
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/04/2010 1457
Date Prepared: 03/03/2010 1132
Analysis Batch: 660-91401
Prep Batch: 660-91336
Instrument ID: ICPA
Lab File ID: 10C04A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

MSD Lab Sample ID: 660-33998-F-1-C MSD
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/04/2010 1503
Date Prepared: 03/03/2010 1132
Analysis Batch: 660-91401
Prep Batch: 660-91336
Instrument ID: ICPA
Lab File ID: 10C04A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Aluminum | 154 | 154 | 75 - 125 | 0 | 20 | J3 | J3 |
| Arsenic | 96 | 96 | 75 - 125 | 1 | 20 | | |
| Boron | 96 | 96 | 75 - 125 | 1 | 20 | | |
| Potassium | 101 | 102 | 75 - 125 | 1 | 20 | | |
| Barium | 99 | 99 | 75 - 125 | 1 | 20 | | |
| Calcium | 88 | 33 | 75 - 125 | 1 | 20 | | J3 |
| Cadmium | 93 | 93 | 75 - 125 | 0 | 20 | | |
| Cobalt | 89 | 89 | 75 - 125 | 0 | 20 | | |
| Chromium | 92 | 92 | 75 - 125 | 0 | 20 | | |
| Copper | 101 | 101 | 75 - 125 | 1 | 20 | | |
| Iron | 98 | 98 | 75 - 125 | 0 | 20 | | |
| Magnesium | 91 | 89 | 75 - 125 | 1 | 20 | | |
| Manganese | 95 | 95 | 75 - 125 | 0 | 20 | | |
| Sodium | 107 | 108 | 75 - 125 | 0 | 20 | | |
| Lead | 94 | 94 | 75 - 125 | 0 | 20 | | |
| Strontium | 100 | 101 | 75 - 125 | 1 | 20 | | |
| Titanium | 98 | 98 | 75 - 125 | 0 | 20 | | |
| Vanadium | 95 | 95 | 75 - 125 | 0 | 20 | | |
| Zinc | 88 | 88 | 75 - 125 | 0 | 20 | | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

## Method Blank - Batch: 660-91270

**Method: 7470A**
**Preparation: 7470A**

Lab Sample ID: MB 660-91270/1-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/02/2010 1243
Date Prepared: 03/02/2010 0900

Analysis Batch: 660-91291
Prep Batch: 660-91270
Units: mg/L

Instrument ID: PS200II
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Mercury | 0.000072 | U | 0.000072 | 0.00020 |

## Lab Control Sample - Batch: 660-91270

**Method: 7470A**
**Preparation: 7470A**

Lab Sample ID: LCS 660-91270/2-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/02/2010 1246
Date Prepared: 03/02/2010 0900

Analysis Batch: 660-91291
Prep Batch: 660-91270
Units: mg/L

Instrument ID: PS200II
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Mercury | 0.00100 | 0.000948 | 95 | 80 - 120 | |

## Matrix Spike/
## Matrix Spike Duplicate Recovery Report - Batch: 660-91270

**Method: 7470A**
**Preparation: 7470A**

MS Lab Sample ID: 660-33886-6
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/02/2010 1256
Date Prepared: 03/02/2010 0900

Analysis Batch: 660-91291
Prep Batch: 660-91270

Instrument ID: PS200II
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

MSD Lab Sample ID: 660-33886-6
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/02/2010 1258
Date Prepared: 03/02/2010 0900

Analysis Batch: 660-91291
Prep Batch: 660-91270

Instrument ID: PS200II
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Mercury | 96 | 94 | 80 - 120 | 2 | 20 | | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

## Method Blank - Batch: 660-91390

**Method: 7471A**
**Preparation: 7471A**

Lab Sample ID: MB 660-91390/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/04/2010 1357
Date Prepared: 03/04/2010 1100

Analysis Batch: 660-91412
Prep Batch: 660-91390
Units: mg/Kg

Instrument ID: PS200II
Lab File ID: N/A
Initial Weight/Volume: 0.30 g
Final Weight/Volume: 50 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Mercury | 0.0075 | U | 0.0075 | 0.020 |

## Lab Control Sample - Batch: 660-91390

**Method: 7471A**
**Preparation: 7471A**

Lab Sample ID: LCS 660-91390/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/04/2010 1400
Date Prepared: 03/04/2010 1100

Analysis Batch: 660-91412
Prep Batch: 660-91390
Units: mg/Kg

Instrument ID: PS200II
Lab File ID: N/A
Initial Weight/Volume: 0.30 g
Final Weight/Volume: 50 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Mercury | 0.167 | 0.188 | 113 | 80 - 120 | |

## Matrix Spike/
## Matrix Spike Duplicate Recovery Report - Batch: 660-91390

**Method: 7471A**
**Preparation: 7471A**

MS Lab Sample ID: 660-34106-A-2-B MS
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/04/2010 1449
Date Prepared: 03/04/2010 1100

Analysis Batch: 660-91412
Prep Batch: 660-91390

Instrument ID: PS200II
Lab File ID: N/A
Initial Weight/Volume: 0.30 g
Final Weight/Volume: 50 mL

MSD Lab Sample ID: 660-34106-A-2-C MSD
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/04/2010 1451
Date Prepared: 03/04/2010 1100

Analysis Batch: 660-91412
Prep Batch: 660-91390

Instrument ID: PS200II
Lab File ID: N/A
Initial Weight/Volume: 0.30 g
Final Weight/Volume: 50 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Mercury | 109 | 136 | 80 - 120 | 14 | 20 | | J3 |

## Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Method Blank - Batch: 660-90879**

**Method: 180.1**
**Preparation: N/A**

Lab Sample ID: MB 660-90879/3
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/18/2010 0930
Date Prepared: N/A

Analysis Batch: 660-90879
Prep Batch: N/A
Units: NTU

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume:
Final Weight/Volume: 30 mL

| Analyte | Result | Qual | PQL | PQL |
|---|---|---|---|---|
| Turbidity | 0.10 | U | 0.10 | 0.10 |

**Lab Control Sample - Batch: 660-90879**

**Method: 180.1**
**Preparation: N/A**

Lab Sample ID: LCS 660-90879/4
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/18/2010 0930
Date Prepared: N/A

Analysis Batch: 660-90879
Prep Batch: N/A
Units: NTU

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume:
Final Weight/Volume: 30 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Turbidity | 40.0 | 39.9 | 100 | 90 - 110 | |

**Duplicate - Batch: 660-90879**

**Method: 180.1**
**Preparation: N/A**

Lab Sample ID: 660-33886-6
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/18/2010 0930
Date Prepared: N/A

Analysis Batch: 660-90879
Prep Batch: N/A
Units: NTU

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume:
Final Weight/Volume: 30 mL

| Analyte | Sample Result/Qual | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|
| Turbidity | 4.9 | 4.77 | 3 | 20 | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

## Method Blank - Batch: 680-161659

**Method: 350.1**
**Preparation: 3-154**

Lab Sample ID: MB 680-161659/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/26/2010 1111
Date Prepared: 02/25/2010 1234

Analysis Batch: 680-161811
Prep Batch: 680-161659
Units: mg/Kg

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 20.05 g
Final Weight/Volume: 100 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Ammonia (as N) | 0.13 | U | 0.13 | 0.30 |

## Lab Control Sample - Batch: 680-161659

**Method: 350.1**
**Preparation: 3-154**

Lab Sample ID: LCS 680-161659/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/26/2010 1111
Date Prepared: 02/25/2010 1234

Analysis Batch: 680-161811
Prep Batch: 680-161659
Units: mg/Kg

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 19.95 g
Final Weight/Volume: 100 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Ammonia (as N) | 5.01 | 4.94 | 99 | 75 - 125 | |

## Matrix Spike/ Matrix Spike Duplicate Recovery Report - Batch: 680-161659

**Method: 350.1**
**Preparation: 3-154**

MS Lab Sample ID: 660-33863-D-2-B MS
Client Matrix: Solid
Dilution: 10
Date Analyzed: 02/26/2010 1159
Date Prepared: 02/25/2010 1234

Analysis Batch: 680-161811
Prep Batch: 680-161659

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 19.99 g
Final Weight/Volume: 100 mL

MSD Lab Sample ID: 660-33863-D-2-C MSD
Client Matrix: Solid
Dilution: 10
Date Analyzed: 02/26/2010 1159
Date Prepared: 02/25/2010 1234

Analysis Batch: 680-161811
Prep Batch: 680-161659

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 20.00 g
Final Weight/Volume: 100 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Ammonia (as N) | 42 | 73 | 75 - 125 | 3 | 30 | J3 | J3 |

## Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Duplicate - Batch: 680-161659**

**Method: 350.1**
**Preparation: 3-154**

Lab Sample ID: 660-33914-D-8-B DU
Client Matrix: Solid
Dilution: 2.0
Date Analyzed: 02/26/2010 1148
Date Prepared: 02/25/2010 1234

Analysis Batch: 680-161811
Prep Batch: 680-161659
Units: mg/Kg

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 20.06 g
Final Weight/Volume: 100 mL

| Analyte | Sample Result/Qual | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|
| Ammonia (as N) | 9.3 | 11.1 | 17 | 30 | |

### Method Blank - Batch: 660-91191

**Method: 350.1**
**Preparation: N/A**

Lab Sample ID: MB 660-91191/11
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/26/2010 1424
Date Prepared: N/A

Analysis Batch: 660-91191
Prep Batch: N/A
Units: mg/L

Instrument ID: LACHAT
Lab File ID: N/A
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Ammonia (as N) | 0.010 | U | 0.010 | 0.020 |

### Lab Control Sample - Batch: 660-91191

**Method: 350.1**
**Preparation: N/A**

Lab Sample ID: LCS 660-91191/12
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/26/2010 1425
Date Prepared: N/A

Analysis Batch: 660-91191
Prep Batch: N/A
Units: mg/L

Instrument ID: LACHAT
Lab File ID: N/A
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Ammonia (as N) | 0.500 | 0.477 | 95 | 90 - 110 | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

## Method Blank - Batch: 660-90906

**Method: 353.2**
**Preparation: N/A**

Lab Sample ID: MB 660-90906/1
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/18/2010 1002
Date Prepared: N/A

Analysis Batch: 660-90906
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Nitrate Nitrite as N | 0.10 | U | 0.10 | 0.50 |
| Nitrite as N | 0.10 | U | 0.10 | 0.50 |
| Nitrate as N | 0.10 | U | 0.10 | 0.50 |

## Lab Control Sample - Batch: 660-90906

**Method: 353.2**
**Preparation: N/A**

Lab Sample ID: LCS 660-90906/2
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/18/2010 1002
Date Prepared: N/A

Analysis Batch: 660-90906
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Nitrate Nitrite as N | 1.00 | 0.992 | 99 | 90 - 110 | |
| Nitrite as N | 1.00 | 0.938 | 94 | 90 - 110 | |

## Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

### Matrix Spike/
### Matrix Spike Duplicate Recovery Report - Batch: 660-90906

**Method: 353.2**
**Preparation: N/A**

MS Lab Sample ID: 660-33881-A-1 MS
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/18/2010 1002
Date Prepared: N/A

Analysis Batch: 660-90906
Prep Batch: N/A

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

MSD Lab Sample ID: 660-33881-A-1 MSD
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/18/2010 1002
Date Prepared: N/A

Analysis Batch: 660-90906
Prep Batch: N/A

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

|  | % Rec. |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Nitrate Nitrite as N | 95 | 100 | 90 - 110 | 5 | 30 |  |  |
| Nitrite as N | 77 | 77 | 90 - 110 | 1 | 30 | J3 | J3 |

**Method Blank - Batch: 660-91352**

**Method: 353.2**
**Preparation: N/A**

Lab Sample ID: MB 660-91350/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/03/2010 0939
Date Prepared: N/A
Date Leached: 03/01/2010 1600

Analysis Batch: 660-91352
Prep Batch: N/A
Units: mg/Kg
Leachate Batch: 660-91350

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Nitrate Nitrite as N-Soluble | 1.0 | U | 1.0 | 5.0 |
| Nitrite as N-Soluble | 1.0 | U | 1.0 | 5.0 |
| Nitrate as N-Soluble | 1.0 | U | 1.0 | 5.0 |

**Lab Control Sample - Batch: 660-91352**

**Method: 353.2**
**Preparation: N/A**

Lab Sample ID: LCS 660-91350/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/03/2010 0939
Date Prepared: N/A
Date Leached: 03/01/2010 1600

Analysis Batch: 660-91352
Prep Batch: N/A
Units: mg/Kg
Leachate Batch: 660-91350

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Nitrate Nitrite as N-Soluble | 10.0 | 9.80 | 98 | 90 - 110 | |
| Nitrite as N-Soluble | 10.0 | 9.46 | 95 | 90 - 110 | |

### Matrix Spike/
### Matrix Spike Duplicate Recovery Report - Batch: 660-91352

**Method: 353.2**
**Preparation: N/A**

MS Lab Sample ID: 660-33863-C-1-F MS
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/03/2010 0939
Date Prepared: N/A
Date Leached: 03/01/2010 1600

Analysis Batch: 660-91352
Prep Batch: N/A
Leachate Batch: 660-91350

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

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MSD Lab Sample ID: 660-33863-C-1-G MSD
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/03/2010 0939
Date Prepared: N/A
Date Leached: 03/01/2010 1600

Analysis Batch: 660-91352
Prep Batch: N/A
Leachate Batch: 660-91350

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Nitrate Nitrite as N-Soluble | 106 | 107 | 90 - 110 | 1 | 20 | | |
| Nitrite as N-Soluble | 110 | 105 | 90 - 110 | 5 | 20 | | |

### Method Blank - Batch: 660-91108

**Method: 365.1**
**Preparation: N/A**

| | | | | | |
|---|---|---|---|---|---|
| Lab Sample ID: | MB 660-91108/11 | Analysis Batch: 660-91108 | | Instrument ID: | No Equipment Assigned |
| Client Matrix: | Water | Prep Batch: N/A | | Lab File ID: | N/A |
| Dilution: | 1.0 | Units: mg/L | | Initial Weight/Volume: | 1.0 mL |
| Date Analyzed: | 02/18/2010 1328 | | | Final Weight/Volume: | 2 mL |
| Date Prepared: | N/A | | | | |

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Orthophosphate-Dissolved | 0.010 | U | 0.010 | 0.040 |

### Lab Control Sample - Batch: 660-91108

**Method: 365.1**
**Preparation: N/A**

| | | | | | |
|---|---|---|---|---|---|
| Lab Sample ID: | LCS 660-91108/12 | Analysis Batch: 660-91108 | | Instrument ID: | No Equipment Assigned |
| Client Matrix: | Water | Prep Batch: N/A | | Lab File ID: | N/A |
| Dilution: | 1.0 | Units: mg/L | | Initial Weight/Volume: | 1.0 mL |
| Date Analyzed: | 02/18/2010 1328 | | | Final Weight/Volume: | 2 mL |
| Date Prepared: | N/A | | | | |

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Orthophosphate-Dissolved | 0.300 | 0.306 | 102 | 90 - 110 | |

### Matrix Spike/
### Matrix Spike Duplicate Recovery Report - Batch: 660-91108

**Method: 365.1**
**Preparation: N/A**

| | | | | | |
|---|---|---|---|---|---|
| MS Lab Sample ID: | 660-33886-5 | Analysis Batch: 660-91108 | | Instrument ID: | No Equipment Assigned |
| Client Matrix: | Water | Prep Batch: N/A | | Lab File ID: | N/A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 1.0 mL |
| Date Analyzed: | 02/18/2010 1328 | | | Final Weight/Volume: | 2 mL |
| Date Prepared: | N/A | | | | |

| | | | | | |
|---|---|---|---|---|---|
| MSD Lab Sample ID: | 660-33886-5 | Analysis Batch: 660-91108 | | Instrument ID: | No Equipment Assigned |
| Client Matrix: | Water | Prep Batch: N/A | | Lab File ID: | N/A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 1.0 mL |
| Date Analyzed: | 02/18/2010 1328 | | | Final Weight/Volume: | 2 mL |
| Date Prepared: | N/A | | | | |

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Orthophosphate-Dissolved | 105 | 102 | 90 - 110 | 2 | 30 | | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

## Method Blank - Batch: 680-161349

**Method: 365.4**
**Preparation: 365.2/365.3/365**

Lab Sample ID: MB 680-161349/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/24/2010 1400
Date Prepared: 02/22/2010 1258

Analysis Batch: 680-161565
Prep Batch: 680-161349
Units: mg/Kg

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 0.200 g
Final Weight/Volume: 40 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Phosphorus | 11 | U | 11 | 20 |

## Lab Control Sample/ Lab Control Sample Duplicate Recovery Report - Batch: 680-161349

**Method: 365.4**
**Preparation: 365.2/365.3/365**

LCS Lab Sample ID: LCS 680-161349/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/24/2010 1400
Date Prepared: 02/22/2010 1258

Analysis Batch: 680-161565
Prep Batch: 680-161349
Units: mg/Kg

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 0.200 g
Final Weight/Volume: 40 mL

LCSD Lab Sample ID: LCSD 680-161349/3-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/24/2010 1400
Date Prepared: 02/22/2010 1258

Analysis Batch: 680-161565
Prep Batch: 680-161349
Units: mg/Kg

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 0.200 g
Final Weight/Volume: 40 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | LCS | LCSD | Limit | RPD | RPD Limit | LCS Qual | LCSD Qual |
| Phosphorus | 95 | 97 | 60 - 140 | 3 | 40 | | |

## Duplicate - Batch: 680-161349

**Method: 365.4**
**Preparation: 365.2/365.3/365**

Lab Sample ID: 660-33914-E-11-B DU
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/24/2010 1417
Date Prepared: 02/22/2010 1258

Analysis Batch: 680-161565
Prep Batch: 680-161349
Units: mg/Kg

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 0.2395 g
Final Weight/Volume: 40 mL

| Analyte | Sample Result/Qual | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|
| Phosphorus | 270 | 432 | 45 | 40 | J3 |

### Method Blank - Batch: 660-91250

**Method: 365.4**
**Preparation: 365.2/365.3/365**

Lab Sample ID: MB 660-91250/10-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/03/2010 1113
Date Prepared: 03/01/2010 1700

Analysis Batch: 660-91349
Prep Batch: 660-91250
Units: mg/L

Instrument ID: SEAL1
Lab File ID: N/A
Initial Weight/Volume: 20 mL
Final Weight/Volume: 20 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Phosphorus, Total | 0.10 | U | 0.10 | 0.30 |

### Lab Control Sample - Batch: 660-91250

**Method: 365.4**
**Preparation: 365.2/365.3/365**

Lab Sample ID: LCS 660-91250/11-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/03/2010 1113
Date Prepared: 03/01/2010 1700

Analysis Batch: 660-91349
Prep Batch: 660-91250
Units: mg/L

Instrument ID: SEAL1
Lab File ID: N/A
Initial Weight/Volume: 20 mL
Final Weight/Volume: 20 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Phosphorus, Total | 3.00 | 3.03 | 101 | 90 - 110 | |

### Matrix Spike/
### Matrix Spike Duplicate Recovery Report - Batch: 660-91250

**Method: 365.4**
**Preparation: 365.2/365.3/365**

MS Lab Sample ID: 660-33886-6
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/03/2010 1113
Date Prepared: 03/01/2010 1700

Analysis Batch: 660-91349
Prep Batch: 660-91250

Instrument ID: SEAL1
Lab File ID: N/A
Initial Weight/Volume: 20 mL
Final Weight/Volume: 20 mL

MSD Lab Sample ID: 660-33886-6
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/03/2010 1113
Date Prepared: 03/01/2010 1700

Analysis Batch: 660-91349
Prep Batch: 660-91250

Instrument ID: SEAL1
Lab File ID: N/A
Initial Weight/Volume: 20 mL
Final Weight/Volume: 20 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Phosphorus, Total | 102 | 104 | 90 - 110 | 2 | 30 | | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

## Method Blank - Batch: 680-161395

**Method: 9034**
**Preparation: 9030B**

Lab Sample ID: MB 680-161395/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/23/2010 1430
Date Prepared: 02/23/2010 1144

Analysis Batch: 680-161436
Prep Batch: 680-161395
Units: mg/Kg

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 10.00 g
Final Weight/Volume: 250 mL

| Analyte | Result | Qual | PQL | PQL |
|---|---|---|---|---|
| Sulfide | 25 | U | 25 | 25 |

## Lab Control Sample - Batch: 680-161395

**Method: 9034**
**Preparation: 9030B**

Lab Sample ID: LCS 680-161395/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/23/2010 1430
Date Prepared: 02/23/2010 1144

Analysis Batch: 680-161436
Prep Batch: 680-161395
Units: mg/Kg

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 10.00 g
Final Weight/Volume: 250 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Sulfide | 252 | 207 | 82 | 50 - 150 | |

## Matrix Spike/ Matrix Spike Duplicate Recovery Report - Batch: 680-161395

**Method: 9034**
**Preparation: 9030B**

MS Lab Sample ID: 660-33863-E-4-C MS
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/23/2010 1430
Date Prepared: 02/23/2010 1144

Analysis Batch: 680-161436
Prep Batch: 680-161395

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 10.03 g
Final Weight/Volume: 250 mL

MSD Lab Sample ID: 660-33863-E-4-D MSD
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/23/2010 1430
Date Prepared: 02/23/2010 1144

Analysis Batch: 680-161436
Prep Batch: 680-161395

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 10.03 g
Final Weight/Volume: 250 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Sulfide | 84 | 83 | 50 - 150 | 2 | 50 | | |

## Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

### Method Blank - Batch: 680-162106

**Method: 9038**
**Preparation: N/A**

Lab Sample ID: MB 680-162053/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/02/2010 1707
Date Prepared: N/A
Date Leached: 03/02/2010 1138

Analysis Batch: 680-162106
Prep Batch: N/A
Units: mg/Kg
Leachate Batch: 680-162053

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL

| Analyte | Result | Qual | PQL | PQL |
|---|---|---|---|---|
| Sulfate-Soluble | 100 | U | 100 | 100 |

### Lab Control Sample/
### Lab Control Sample Duplicate Recovery Report - Batch: 680-162106

**Method: 9038**
**Preparation: N/A**

LCS Lab Sample ID: LCS 680-162053/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/02/2010 1707
Date Prepared: N/A
Date Leached: 03/02/2010 1138

Analysis Batch: 680-162106
Prep Batch: N/A
Units: mg/Kg
Leachate Batch: 680-162053

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL

LCSD Lab Sample ID: LCSD 680-162053/3-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/02/2010 1707
Date Prepared: N/A
Date Leached: 03/02/2010 1138

Analysis Batch: 680-162106
Prep Batch: N/A
Units: mg/Kg
Leachate Batch: 680-162053

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL

|  | % Rec. |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|
| Analyte | LCS | LCSD | Limit | RPD | RPD Limit | LCS Qual | LCSD Qual |
| Sulfate-Soluble | 100 | 100 | 75 - 125 | 0 | 30 |  |  |

# Quality Control Results

Client: Environmental Engineering Consultant
Job Number: 660-33886-1

## Matrix Spike/ Matrix Spike Duplicate Recovery Report - Batch: 680-162106

**Method: 9038**
**Preparation: N/A**

MS Lab Sample ID: 660-33863-D-1-C MS
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/02/2010 1709
Date Prepared: N/A
Date Leached: 03/02/2010 1138

Analysis Batch: 680-162106
Prep Batch: N/A
Leachate Batch: 680-162053

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL

MSD Lab Sample ID: 660-33863-D-1-D MSD
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/02/2010 1709
Date Prepared: N/A
Date Leached: 03/02/2010 1138

Analysis Batch: 680-162106
Prep Batch: N/A
Leachate Batch: 680-162053

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Sulfate-Soluble | 119 | 113 | 75 - 125 | 7 | 30 | | |

## Duplicate - Batch: 680-162106

**Method: 9038**
**Preparation: N/A**

Lab Sample ID: 660-33914-D-11-C DU
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/02/2010 1726
Date Prepared: N/A
Date Leached: 03/02/2010 1138

Analysis Batch: 680-162106
Prep Batch: N/A
Units: mg/Kg
Leachate Batch: 680-162053

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL

| Analyte | Sample Result/Qual | | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|---|
| Sulfate-Soluble | 96 | U | 98 | NC | 30 | U |

### Method Blank - Batch: 660-90922

**Method: 9045C**
**Preparation: N/A**

Lab Sample ID: MB 660-90923/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/18/2010 2145
Date Prepared: N/A
Date Leached: 02/18/2010 1907

Analysis Batch: 660-90922
Prep Batch: N/A
Units: SU
Leachate Batch: 660-90923

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL

| Analyte | Result | Qual | PQL | PQL |
|---|---|---|---|---|
| pH-Soluble | 7.520 | | 1.00 | 1.00 |

### Lab Control Sample - Batch: 660-90922

**Method: 9045C**
**Preparation: N/A**

Lab Sample ID: LCS 660-90923/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/18/2010 2145
Date Prepared: N/A
Date Leached: 02/18/2010 1907

Analysis Batch: 660-90922
Prep Batch: N/A
Units: SU
Leachate Batch: 660-90923

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| pH-Soluble | 6.00 | 5.990 | 100 | 98 - 102 | |

### Duplicate - Batch: 660-90922

**Method: 9045C**
**Preparation: N/A**

Lab Sample ID: 660-33886-4
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/18/2010 2145
Date Prepared: N/A
Date Leached: 02/18/2010 1907

Analysis Batch: 660-90922
Prep Batch: N/A
Units: SU
Leachate Batch: 660-90923

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL

| Analyte | Sample Result/Qual | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|
| pH-Soluble | 7.53 | 7.530 | 0 | 20 | Q |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

## Method Blank - Batch: 680-161519

**Method: 9060**
**Preparation: N/A**

Lab Sample ID: MB 680-161519/1
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/23/2010 1035
Date Prepared: N/A

Analysis Batch: 680-161519
Prep Batch: N/A
Units: mg/Kg

Instrument ID: TOC2
Lab File ID: N/A
Initial Weight/Volume: 100 mg
Final Weight/Volume: 1.0 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Total Organic Carbon | 1000 | U | 1000 | 3000 |

## Lab Control Sample - Batch: 680-161519

**Method: 9060**
**Preparation: N/A**

Lab Sample ID: LCS 680-161519/2
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/23/2010 1035
Date Prepared: N/A

Analysis Batch: 680-161519
Prep Batch: N/A
Units: mg/Kg

Instrument ID: TOC2
Lab File ID: N/A
Initial Weight/Volume: 20.5 mg
Final Weight/Volume: 1.0 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Total Organic Carbon | 408000 | 377000 | 92 | 60 - 140 | |

## Matrix Spike/ Matrix Spike Duplicate Recovery Report - Batch: 680-161519

**Method: 9060**
**Preparation: N/A**

MS Lab Sample ID: 680-55167-A-8 MS
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/23/2010 1035
Date Prepared: N/A

Analysis Batch: 680-161519
Prep Batch: N/A

Instrument ID: TOC2
Lab File ID: N/A
Initial Weight/Volume: 113.5 mg
Final Weight/Volume: 113.5 mg

MSD Lab Sample ID: 680-55167-A-8 MSD
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/23/2010 1035
Date Prepared: N/A

Analysis Batch: 680-161519
Prep Batch: N/A

Instrument ID: TOC2
Lab File ID: N/A
Initial Weight/Volume: 113.1 mg
Final Weight/Volume: 113.1 mg

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Total Organic Carbon | 83 | 83 | 60 - 140 | 1 | 40 | | |

## Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Duplicate - Batch: 680-161519**

**Method: 9060**
**Preparation: N/A**

Lab Sample ID: 680-55167-A-2 DU
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/23/2010 1035
Date Prepared: N/A

Analysis Batch: 680-161519
Prep Batch: N/A
Units: mg/Kg

Instrument ID: TOC2
Lab File ID: N/A
Initial Weight/Volume: 97.0 mg
Final Weight/Volume: 1.0 mL

| Analyte | Sample Result/Qual | | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|---|
| Total Organic Carbon | 1500 | I | 1760 | 13 | 40 | I |

### Method Blank - Batch: 660-90996

**Method: SM 2320B**
**Preparation: N/A**

Lab Sample ID: MB 660-90996/3
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/23/2010 1010
Date Prepared: N/A

Analysis Batch: 660-90996
Prep Batch: N/A
Units: mg/L

Instrument ID: MANTECH
Lab File ID: N/A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Result | Qual | PQL | PQL |
|---|---|---|---|---|
| Alkalinity | 1.0 | U | 1.0 | 1.0 |

### Lab Control Sample - Batch: 660-90996

**Method: SM 2320B**
**Preparation: N/A**

Lab Sample ID: LCS 660-90996/4
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/23/2010 1017
Date Prepared: N/A

Analysis Batch: 660-90996
Prep Batch: N/A
Units: mg/L

Instrument ID: MANTECH
Lab File ID: N/A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Alkalinity | 118 | 119 | 101 | 80 - 120 | |

### Duplicate - Batch: 660-90996

**Method: SM 2320B**
**Preparation: N/A**

Lab Sample ID: 660-33880-D-1 DU
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/23/2010 1158
Date Prepared: N/A

Analysis Batch: 660-90996
Prep Batch: N/A
Units: mg/L

Instrument ID: MANTECH
Lab File ID: N/A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Sample Result/Qual | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|
| Alkalinity | 84 | 86.1 | 3 | 30 | |

## Method Blank - Batch: 660-91136

**Method: SM 2520B**
**Preparation: N/A**

Lab Sample ID: MB 660-91136/1
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1200
Date Prepared: N/A

Analysis Batch: 660-91136
Prep Batch: N/A
Units: ppt

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 100 mL

| Analyte | Result | Qual | PQL | PQL |
|---|---|---|---|---|
| Salinity | 2.0 | U | 2.0 | 2.0 |

## Lab Control Sample/ Lab Control Sample Duplicate Recovery Report - Batch: 660-91136

**Method: SM 2520B**
**Preparation: N/A**

LCS Lab Sample ID: LCS 660-91136/2
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1200
Date Prepared: N/A

Analysis Batch: 660-91136
Prep Batch: N/A
Units: ppt

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 100 mL

LCSD Lab Sample ID: LCSD 660-91136/3
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1200
Date Prepared: N/A

Analysis Batch: 660-91136
Prep Batch: N/A
Units: ppt

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 100 mL

|  | % Rec. |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|
| Analyte | LCS | LCSD | Limit | RPD | RPD Limit | LCS Qual | LCSD Qual |
| Salinity | 103 | 103 | 90 - 110 | 0 | 10 |  |  |

### Duplicate - Batch: 660-91136

**Method: SM 2520B**
**Preparation: N/A**

Lab Sample ID: 660-33886-6
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1200
Date Prepared: N/A

Analysis Batch: 660-91136
Prep Batch: N/A
Units: ppt

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 100 mL

| Analyte | Sample Result/Qual | | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|---|
| Salinity | 2.0 | U | 2.0 | NC | 10 | U |

### Duplicate - Batch: 660-91136

**Method: SM 2520B**
**Preparation: N/A**

Lab Sample ID: 660-33886-7
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1200
Date Prepared: N/A

Analysis Batch: 660-91136
Prep Batch: N/A
Units: ppt

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 100 mL

| Analyte | Sample Result/Qual | | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|---|
| Salinity | 2.0 | U | 2.0 | NC | 10 | U |

### Method Blank - Batch: 660-90872

**Method: SM 2540D**
**Preparation: N/A**

Lab Sample ID: MB 660-90872/1
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 1455
Date Prepared: N/A

Analysis Batch: 660-90872
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 250 mL
Final Weight/Volume: 250 mL

| Analyte | Result | Qual | PQL | PQL |
|---|---|---|---|---|
| Total Suspended Solids | 1.0 | U | 1.0 | 1.0 |

### Lab Control Sample - Batch: 660-90872

**Method: SM 2540D**
**Preparation: N/A**

Lab Sample ID: LCS 660-90872/2
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 1455
Date Prepared: N/A

Analysis Batch: 660-90872
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 250 mL
Final Weight/Volume: 250 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Total Suspended Solids | 100 | 106 | 106 | 80 - 120 | |

### Duplicate - Batch: 660-90872

**Method: SM 2540D**
**Preparation: N/A**

Lab Sample ID: 660-33876-E-1 DU
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 1455
Date Prepared: N/A

Analysis Batch: 660-90872
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 250 mL
Final Weight/Volume: 250 mL

| Analyte | Sample Result/Qual | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|
| Total Suspended Solids | 1.6 | 1.60 | 0 | 20 | |

### Method Blank - Batch: 660-91248

**Method: SM 426C**
**Preparation: N/A**

| | | | | | |
|---|---|---|---|---|---|
| Lab Sample ID: | MB 660-91248/12 | Analysis Batch: | 660-91248 | Instrument ID: | Turbidity |
| Client Matrix: | Water | Prep Batch: | N/A | Lab File ID: | N/A |
| Dilution: | 1.0 | Units: | mg/L | Initial Weight/Volume: | 25 mL |
| Date Analyzed: | 03/01/2010 1350 | | | Final Weight/Volume: | 25 mL |
| Date Prepared: | N/A | | | | |

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Sulfate | 2.0 | U | 2.0 | 5.0 |

### Lab Control Sample - Batch: 660-91248

**Method: SM 426C**
**Preparation: N/A**

| | | | | | |
|---|---|---|---|---|---|
| Lab Sample ID: | LCS 660-91248/13 | Analysis Batch: | 660-91248 | Instrument ID: | Turbidity |
| Client Matrix: | Water | Prep Batch: | N/A | Lab File ID: | N/A |
| Dilution: | 1.0 | Units: | mg/L | Initial Weight/Volume: | 25 mL |
| Date Analyzed: | 03/01/2010 1350 | | | Final Weight/Volume: | 25 mL |
| Date Prepared: | N/A | | | | |

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Sulfate | 10.0 | 9.24 | 92 | 75 - 125 | |

### Matrix Spike/ Matrix Spike Duplicate Recovery Report - Batch: 660-91248

**Method: SM 426C**
**Preparation: N/A**

| | | | | | |
|---|---|---|---|---|---|
| MS Lab Sample ID: | 660-33886-6 | Analysis Batch: | 660-91248 | Instrument ID: | Turbidity |
| Client Matrix: | Water | Prep Batch: | N/A | Lab File ID: | N/A |
| Dilution: | 2.0 | | | Initial Weight/Volume: | 25 mL |
| Date Analyzed: | 03/01/2010 1350 | | | Final Weight/Volume: | 25 mL |
| Date Prepared: | N/A | | | | |

| | | | | | |
|---|---|---|---|---|---|
| MSD Lab Sample ID: | 660-33886-6 | Analysis Batch: | 660-91248 | Instrument ID: | Turbidity |
| Client Matrix: | Water | Prep Batch: | N/A | Lab File ID: | N/A |
| Dilution: | 2.0 | | | Initial Weight/Volume: | 25 mL |
| Date Analyzed: | 03/01/2010 1350 | | | Final Weight/Volume: | 25 mL |
| Date Prepared: | N/A | | | | |

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Sulfate | 124 | 120 | 75 - 125 | 1 | 30 | | |

## Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

### Method Blank - Batch: 660-91434

**Method: SM 426C**
**Preparation: N/A**

Lab Sample ID: MB 660-91434/12
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/04/2010 1100
Date Prepared: N/A

Analysis Batch: 660-91434
Prep Batch: N/A
Units: mg/L

Instrument ID: Turbidity
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Sulfate | 2.0 | U | 2.0 | 5.0 |

### Lab Control Sample - Batch: 660-91434

**Method: SM 426C**
**Preparation: N/A**

Lab Sample ID: LCS 660-91434/13
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/04/2010 1100
Date Prepared: N/A

Analysis Batch: 660-91434
Prep Batch: N/A
Units: mg/L

Instrument ID: Turbidity
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Sulfate | 10.0 | 10.2 | 102 | 75 - 125 | |

### Matrix Spike/
### Matrix Spike Duplicate Recovery Report - Batch: 660-91434

**Method: SM 426C**
**Preparation: N/A**

MS Lab Sample ID: 660-33914-N-2 MS
Client Matrix: Water
Dilution: 5.0
Date Analyzed: 03/04/2010 1100
Date Prepared: N/A

Analysis Batch: 660-91434
Prep Batch: N/A

Instrument ID: Turbidity
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

MSD Lab Sample ID: 660-33914-N-2 MSD
Client Matrix: Water
Dilution: 5.0
Date Analyzed: 03/04/2010 1100
Date Prepared: N/A

Analysis Batch: 660-91434
Prep Batch: N/A

Instrument ID: Turbidity
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Sulfate | 121 | 106 | 75 - 125 | 5 | 30 | | |

**Method Blank - Batch: 660-91159**

**Method: SM 4500 Cl- E**
**Preparation: N/A**

Lab Sample ID: MB 660-91159/3
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1400
Date Prepared: N/A

Analysis Batch: 660-91159
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 2 mL
Final Weight/Volume: 2 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Chloride | 3.0 | U | 3.0 | 5.0 |

**Lab Control Sample - Batch: 660-91159**

**Method: SM 4500 Cl- E**
**Preparation: N/A**

Lab Sample ID: LCS 660-91159/4
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1400
Date Prepared: N/A

Analysis Batch: 660-91159
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 2 mL
Final Weight/Volume: 2 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Chloride | 25.0 | 24.8 | 99 | 90 - 110 | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Matrix Spike/**
**Matrix Spike Duplicate Recovery Report - Batch: 660-91159**

**Method: SM 4500 Cl- E**
**Preparation: N/A**

| | | | | | |
|---|---|---|---|---|---|
| MS Lab Sample ID: | 660-33886-6 | Analysis Batch: | 660-91159 | Instrument ID: | No Equipment Assigned |
| Client Matrix: | Water | Prep Batch: | N/A | Lab File ID: | N/A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 2 mL |
| Date Analyzed: | 02/25/2010 1400 | | | Final Weight/Volume: | 2 mL |
| Date Prepared: | N/A | | | | |

| | | | | | |
|---|---|---|---|---|---|
| MSD Lab Sample ID: | 660-33886-6 | Analysis Batch: | 660-91159 | Instrument ID: | No Equipment Assigned |
| Client Matrix: | Water | Prep Batch: | N/A | Lab File ID: | N/A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 2 mL |
| Date Analyzed: | 02/25/2010 1400 | | | Final Weight/Volume: | 2 mL |
| Date Prepared: | N/A | | | | |

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Chloride | 95 | 100 | 90 - 110 | 1 | 30 | | |

**Matrix Spike/**
**Matrix Spike Duplicate Recovery Report - Batch: 660-91159**

**Method: SM 4500 Cl- E**
**Preparation: N/A**

| | | | | | |
|---|---|---|---|---|---|
| MS Lab Sample ID: | 660-33896-E-1 MS | Analysis Batch: | 660-91159 | Instrument ID: | No Equipment Assigned |
| Client Matrix: | Water | Prep Batch: | N/A | Lab File ID: | N/A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 2 mL |
| Date Analyzed: | 02/25/2010 1400 | | | Final Weight/Volume: | 2 mL |
| Date Prepared: | N/A | | | | |

| | | | | | |
|---|---|---|---|---|---|
| MSD Lab Sample ID: | 660-33896-E-1 MSD | Analysis Batch: | 660-91159 | Instrument ID: | No Equipment Assigned |
| Client Matrix: | Water | Prep Batch: | N/A | Lab File ID: | N/A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 2 mL |
| Date Analyzed: | 02/25/2010 1400 | | | Final Weight/Volume: | 2 mL |
| Date Prepared: | N/A | | | | |

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Chloride | 67 | 78 | 90 - 110 | 1 | 30 | J3 | J3 |

### Method Blank - Batch: 660-91342

**Method: SM 4500 P E**
**Preparation: N/A**

Lab Sample ID: MB 660-91341/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/02/2010 1600
Date Prepared: N/A
Date Leached: 03/01/2010 1600

Analysis Batch: 660-91342
Prep Batch: N/A
Units: mg/L
Leachate Batch: 660-91341

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 50 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Orthophosphate-Soluble | 0.75 | U | 0.75 | 3.0 |

### Lab Control Sample - Batch: 660-91342

**Method: SM 4500 P E**
**Preparation: N/A**

Lab Sample ID: LCS 660-91341/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/02/2010 1600
Date Prepared: N/A
Date Leached: 03/01/2010 1600

Analysis Batch: 660-91342
Prep Batch: N/A
Units: mg/L
Leachate Batch: 660-91341

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 50 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Orthophosphate-Soluble | 3.00 | 3.07 | 102 | 90 - 110 | |

### Matrix Spike/
### Matrix Spike Duplicate Recovery Report - Batch: 660-91342

**Method: SM 4500 P E**
**Preparation: N/A**

MS Lab Sample ID: 660-33863-C-1-C MS
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/02/2010 1600
Date Prepared: N/A
Date Leached: 03/01/2010 1600

Analysis Batch: 660-91342
Prep Batch: N/A
Leachate Batch: 660-91341

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 50 mL

MSD Lab Sample ID: 660-33863-C-1-D MSD
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/02/2010 1600
Date Prepared: N/A
Date Leached: 03/01/2010 1600

Analysis Batch: 660-91342
Prep Batch: N/A
Leachate Batch: 660-91341

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 50 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Orthophosphate-Soluble | 94 | 96 | 90 - 110 | 1 | 30 | | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Method Blank - Batch: 660-90918**

**Method: SM 4500 S2 F**
**Preparation: N/A**

Lab Sample ID: MB 660-90918/1
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 1600
Date Prepared: N/A

Analysis Batch: 660-90918
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 250 mL

| Analyte | Result | Qual | PQL | PQL |
|---|---|---|---|---|
| Sulfide | 1.0 | U | 1.0 | 1.0 |

**Lab Control Sample/**
**Lab Control Sample Duplicate Recovery Report - Batch: 660-90918**

**Method: SM 4500 S2 F**
**Preparation: N/A**

LCS Lab Sample ID: LCS 660-90918/2
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 1600
Date Prepared: N/A

Analysis Batch: 660-90918
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 250 mL

LCSD Lab Sample ID: LCSD 660-90918/3
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 1600
Date Prepared: N/A

Analysis Batch: 660-90918
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 250 mL

|  | % Rec. |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|
| Analyte | LCS | LCSD | Limit | RPD | RPD Limit | LCS Qual | LCSD Qual |
| Sulfide | 88 | 90 | 75 - 125 | 2 | 25 |  |  |

### Method Blank - Batch: 660-91131

**Method: SM 5220D**
**Preparation: SM 5220**

Lab Sample ID: MB 660-91131/3-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1557
Date Prepared: 02/25/2010 1333

Analysis Batch: 660-91132
Prep Batch: 660-91131
Units: mg/L

Instrument ID: HACH
Lab File ID: N/A
Initial Weight/Volume: 2 mL
Final Weight/Volume: 2 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Chemical Oxygen Demand | 10 | U | 10 | 20 |

### Lab Control Sample - Batch: 660-91131

**Method: SM 5220D**
**Preparation: SM 5220**

Lab Sample ID: LCS 660-91131/4-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1557
Date Prepared: 02/25/2010 1333

Analysis Batch: 660-91132
Prep Batch: 660-91131
Units: mg/L

Instrument ID: HACH
Lab File ID: N/A
Initial Weight/Volume: 2 mL
Final Weight/Volume: 2 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Chemical Oxygen Demand | 50.0 | 45.3 | 91 | 90 - 110 | |

## Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

### Matrix Spike/
### Matrix Spike Duplicate Recovery Report - Batch: 660-91131

**Method: SM 5220D**
**Preparation: SM 5220**

MS Lab Sample ID: 640-26108-N-18-B MS
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1557
Date Prepared: 02/25/2010 1333

Analysis Batch: 660-91132
Prep Batch: 660-91131

Instrument ID: HACH
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

MSD Lab Sample ID: 640-26108-N-18-C MSD
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1557
Date Prepared: 02/25/2010 1333

Analysis Batch: 660-91132
Prep Batch: 660-91131

Instrument ID: HACH
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Chemical Oxygen Demand | 90 | 91 | 90 - 110 | 1 | 20 | | |

### Matrix Spike/
### Matrix Spike Duplicate Recovery Report - Batch: 660-91131

**Method: SM 5220D**
**Preparation: SM 5220**

MS Lab Sample ID: 660-33863-N-7-B MS
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1557
Date Prepared: 02/25/2010 1333

Analysis Batch: 660-91132
Prep Batch: 660-91131

Instrument ID: HACH
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

MSD Lab Sample ID: 660-33863-N-7-C MSD
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1557
Date Prepared: 02/25/2010 1333

Analysis Batch: 660-91132
Prep Batch: 660-91131

Instrument ID: HACH
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Chemical Oxygen Demand | 92 | 111 | 90 - 110 | 19 | 20 | | J3 |

## Method Blank - Batch: 660-91273

**Method: SM 5220D**
**Preparation: SM 5220**

Lab Sample ID: MB 660-91273/3-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/02/2010 1021
Date Prepared: 03/01/2010 1230

Analysis Batch: 660-91274
Prep Batch: 660-91273
Units: mg/L

Instrument ID: HACH
Lab File ID: N/A
Initial Weight/Volume: 2 mL
Final Weight/Volume: 2 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Chemical Oxygen Demand | 10 | U | 10 | 20 |

## Lab Control Sample - Batch: 660-91273

**Method: SM 5220D**
**Preparation: SM 5220**

Lab Sample ID: LCS 660-91273/4-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/02/2010 1021
Date Prepared: 03/01/2010 1230

Analysis Batch: 660-91274
Prep Batch: 660-91273
Units: mg/L

Instrument ID: HACH
Lab File ID: N/A
Initial Weight/Volume: 2 mL
Final Weight/Volume: 2 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Chemical Oxygen Demand | 100 | 97.3 | 97 | 90 - 110 | |

## Matrix Spike/ Matrix Spike Duplicate Recovery Report - Batch: 660-91273

**Method: SM 5220D**
**Preparation: SM 5220**

MS Lab Sample ID: 640-26178-A-5-B MS
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/02/2010 1021
Date Prepared: 03/01/2010 1230

Analysis Batch: 660-91274
Prep Batch: 660-91273

Instrument ID: HACH
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

MSD Lab Sample ID: 640-26178-A-5-C MSD
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/02/2010 1021
Date Prepared: 03/01/2010 1230

Analysis Batch: 660-91274
Prep Batch: 660-91273

Instrument ID: HACH
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Chemical Oxygen Demand | 79 | 63 | 90 - 110 | 5 | 20 | J3 | J3 |

### Method Blank - Batch: 640-65864

**Method: SM 5310C**
**Preparation: N/A**

Lab Sample ID: MB 640-65864/1
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 1435
Date Prepared: N/A

Analysis Batch: 640-65864
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 40 mL
Final Weight/Volume: 40 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Total Organic Carbon | 0.35 | U | 0.35 | 1.0 |

### Lab Control Sample/ Lab Control Sample Duplicate Recovery Report - Batch: 640-65864

**Method: SM 5310C**
**Preparation: N/A**

LCS Lab Sample ID: LCS 640-65864/2
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 1449
Date Prepared: N/A

Analysis Batch: 640-65864
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 40 mL
Final Weight/Volume: 40 mL

LCSD Lab Sample ID: LCSD 640-65864/3
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 1503
Date Prepared: N/A

Analysis Batch: 640-65864
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 40 mL
Final Weight/Volume: 40 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | LCS | LCSD | Limit | RPD | RPD Limit | LCS Qual | LCSD Qual |
| Total Organic Carbon | 103 | 103 | 80 - 120 | 0 | 25 | | |

### Duplicate - Batch: 640-65864

**Method: SM 5310C**
**Preparation: N/A**

Lab Sample ID: 640-26226-A-8 DU
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 1856
Date Prepared: N/A

Analysis Batch: 640-65864
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 40 mL
Final Weight/Volume: 40 mL

| Analyte | Sample Result/Qual | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|
| Total Organic Carbon | 16 | 16.4 | 0 | 25 | |

## Method Blank - Batch: 680-161223

**Method: SM 5550B**
**Preparation: N/A**

Lab Sample ID: MB 680-161223/1
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 1126
Date Prepared: N/A

Analysis Batch: 680-161223
Prep Batch: N/A
Units: mg/L

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 2 mL
Final Weight/Volume: 2 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Tannins and Lignins | 0.037 | U | 0.037 | 0.10 |

## Lab Control Sample - Batch: 680-161223

**Method: SM 5550B**
**Preparation: N/A**

Lab Sample ID: LCS 680-161223/2
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 1126
Date Prepared: N/A

Analysis Batch: 680-161223
Prep Batch: N/A
Units: mg/L

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 2 mL
Final Weight/Volume: 2 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Tannins and Lignins | 1.00 | 0.937 | 94 | 80 - 120 | |

## Matrix Spike/ Matrix Spike Duplicate Recovery Report - Batch: 680-161223

**Method: SM 5550B**
**Preparation: N/A**

MS Lab Sample ID: 400-45490-A-1 MS
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 1126
Date Prepared: N/A

Analysis Batch: 680-161223
Prep Batch: N/A

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10 mL

MSD Lab Sample ID: 400-45490-A-1 MSD
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 1126
Date Prepared: N/A

Analysis Batch: 680-161223
Prep Batch: N/A

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Tannins and Lignins | 73 | 69 | 80 - 120 | 1 | 20 | J3 | J3 |

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2960 Foster Creighton Road Nashville, TN 37204 * 800-765-0980 * Fax 615-726-3404

2/26/2010 9:12:16AM

Client: TestAmerica Tampa
6712 Benjamin Road, Suite 100
Tampa, FL 33634

Attn: Nancy Robertson

Work Order: NTB1515
Project Name: GHNS Barbados
Project Number: 660-33886
Date Received: 02/18/10

| SAMPLE IDENTIFICATION | LAB NUMBER | COLLECTION DATE AND TIME |
|---|---|---|
| 2A | NTB1515-01 | 02/16/10 11:00 |
| 1 | NTB1515-02 | 02/16/10 10:00 |
| 3B | NTB1515-03 | 02/16/10 12:20 |
| 3A | NTB1515-04 | 02/16/10 12:40 |
| 4B | NTB1515-05 | 02/16/10 13:50 |
| 5A | NTB1515-06 | 02/16/10 13:30 |
| 4D | NTB1515-07 | 02/16/10 14:40 |

Samples were received into laboratory at a temperature of 2.30 °C.

Comments:

An executed copy of the chain of custody, the project quality control data, and the sample receipt form are also included as an addendum to this report. If you have any questions relating to this analytical report, please contact your Laboratory Project Manager. Any opinions, if expressed, are outside the scope of the Laboratory's accreditation.

Results are reported on a wet weight basis unless otherwise noted

The reported results were obtained in compliance with 2003 NELAC standards unless otherwise noted.

These results relate only to the items tested

Estimated uncertainty is available upon request.

Florida Certification Number: E87358

This report has been electronically signed.

Approved By:

Judith A Beato

**TestAmerica Nashville**
Judith A Beato
Project Manager

Client: TestAmerica Tampa
6712 Benjamin Road, Suite 100
Tampa, FL 33634
Attn: Nancy Robertson

Work Order: NTB1515
Project: GHNS Barbados
Project Number: 660-33886

Sampled: 02/16/10
Received: 02/18/10

## LABORATORY REPORT
### Sample ID: 2A - Lab Number: NTB1515-01 - Matrix: Water

| CAS # | Analyte | Result | Q | Units | MDL | PQL | Dil Factor | Analyzed Date/Time | By | Method | Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | | | | | |
| BOD | **BOD - 5 Day** | **4.38** | Q | mg/L | 2.00 | 2.00 | 1 | 02/23/10 08:30 | MXN | SM 5210B | 10B3734 |
| | | | | | | | | Prep Date: 02/18/10 14:38 | | | |
| NA | **Chlorophyll-a Uncorrected** | **25.3** | Q | ug/L | 2.00 | 2.00 | 1 | 02/23/10 10:20 | SXJ | SM 10200H | 10B4141 |
| | | | | | | | | Filtered Date: 02/18/10 14:22 | | | |

## LABORATORY REPORT
### Sample ID: 1 - Lab Number: NTB1515-02 - Matrix: Water

| CAS # | Analyte | Result | Q | Units | MDL | PQL | Dil Factor | Analyzed Date/Time | By | Method | Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | | | | | |
| BOD | **BOD - 5 Day** | **7.38** | Q | mg/L | 2.00 | 2.00 | 1 | 02/23/10 08:30 | MXN | SM 5210B | 10B3734 |
| | | | | | | | | Prep Date: 02/18/10 14:38 | | | |
| NA | **Chlorophyll-a Uncorrected** | **137** | Q | ug/L | 2.00 | 2.00 | 1 | 02/23/10 10:22 | SXJ | SM 10200H | 10B4141 |
| | | | | | | | | Filtered Date: 02/18/10 14:43 | | | |

## LABORATORY REPORT
### Sample ID: 3B - Lab Number: NTB1515-03 - Matrix: Water

| CAS # | Analyte | Result | Q | Units | MDL | PQL | Dil Factor | Analyzed Date/Time | By | Method | Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | | | | | |
| BOD | **BOD - 5 Day** | **4.64** | Q | mg/L | 2.00 | 2.00 | 1 | 02/23/10 08:30 | MXN | SM 5210B | 10B3734 |
| | | | | | | | | Prep Date: 02/18/10 14:38 | | | |
| NA | **Chlorophyll-a Uncorrected** | **22.6** | Q | ug/L | 2.00 | 2.00 | 1 | 02/23/10 10:23 | SXJ | SM 10200H | 10B4141 |
| | | | | | | | | Filtered Date: 02/18/10 14:45 | | | |

## LABORATORY REPORT
### Sample ID: 3A - Lab Number: NTB1515-04 - Matrix: Water

| CAS # | Analyte | Result | Q | Units | MDL | PQL | Dil Factor | Analyzed Date/Time | By | Method | Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | | | | | |
| BOD | **BOD - 5 Day** | **2.58** | Q | mg/L | 2.00 | 2.00 | 1 | 02/23/10 08:30 | MXN | SM 5210B | 10B3734 |
| | | | | | | | | Prep Date: 02/18/10 14:38 | | | |
| NA | **Chlorophyll-a Uncorrected** | **21.1** | Q | ug/L | 2.00 | 2.00 | 1 | 02/23/10 10:24 | SXJ | SM 10200H | 10B4141 |
| | | | | | | | | Filtered Date: 02/18/10 14:30 | | | |

## LABORATORY REPORT
### Sample ID: 4B - Lab Number: NTB1515-05 - Matrix: Water

| CAS # | Analyte | Result | Q | Units | MDL | PQL | Dil Factor | Analyzed Date/Time | By | Method | Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | | | | | |
| BOD | **BOD - 5 Day** | **6.55** | Q | mg/L | 2.00 | 2.00 | 1 | 02/23/10 08:30 | MXN | SM 5210B | 10B3734 |
| | | | | | | | | Prep Date: 02/18/10 14:38 | | | |

**TestAmerica Nashville**
Judith A Beato
Project Manager

Client: TestAmerica Tampa
6712 Benjamin Road, Suite 100
Tampa, FL 33634
Attn: Nancy Robertson

Work Order: NTB1515
Project: GHNS Barbados
Project Number: 660-33886

Sampled: 02/16/10
Received: 02/18/10

## LABORATORY REPORT
### Sample ID: 4B - Lab Number: NTB1515-05 - Matrix: Water

| CAS # | Analyte | Result | Q | Units | MDL | PQL | Dil Factor | Analyzed Date/Time | By | Method | Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters - Cont.** | | | | | | | | | | | |
| NA | **Chlorophyll-a Uncorrected** | **4.40** | HT3 | ug/L | 2.00 | 2.00 | 1 | 02/23/10 10:25 | SXJ | SM 10200H | 10B4141 |
| | | | | | | | | Filtered Date: 02/18/10 15:15 | | | |

## LABORATORY REPORT
### Sample ID: 5A - Lab Number: NTB1515-06 - Matrix: Water

| CAS # | Analyte | Result | Q | Units | MDL | PQL | Dil Factor | Analyzed Date/Time | By | Method | Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | | | | | |
| BOD | **BOD - 5 Day** | **8.84** | Q | mg/L | 2.00 | 2.00 | 1 | 02/23/10 08:30 | MXN | SM 5210B | 10B3734 |
| | | | | | | | | Prep Date: 02/18/10 14:38 | | | |
| NA | **Chlorophyll-a Uncorrected** | **22.0** | Q | ug/L | 2.00 | 2.00 | 1 | 02/23/10 10:27 | SXJ | SM 10200H | 10B4141 |
| | | | | | | | | Filtered Date: 02/18/10 15:14 | | | |

## LABORATORY REPORT
### Sample ID: 4D - Lab Number: NTB1515-07 - Matrix: Water

| CAS # | Analyte | Result | Q | Units | MDL | PQL | Dil Factor | Analyzed Date/Time | By | Method | Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | | | | | |
| BOD | **BOD - 5 Day** | **11.5** | | mg/L | 2.00 | 2.00 | 1 | 02/23/10 08:30 | MXN | SM 5210B | 10B3734 |
| | | | | | | | | Prep Date: 02/18/10 14:38 | | | |
| NA | **Chlorophyll-a Uncorrected** | **40.7** | | ug/L | 2.00 | 2.00 | 1 | 02/23/10 10:28 | SXJ | SM 10200H | 10B4141 |
| | | | | | | | | Filtered Date: 02/18/10 14:35 | | | |

| | | | | | |
|---|---|---|---|---|---|
| Client: | TestAmerica Tampa<br>6712 Benjamin Road, Suite 100<br>Tampa, FL 33634 | Work Order: | NTB1515 | Sampled: | 02/16/10 |
| | | Project: | GHNS Barbados | Received: | 02/18/10 |
| | | Project Number: | 660-33886 | | |
| Attn: | Nancy Robertson | | | | |

## SAMPLE EXTRACTION DATA

| Parameter | Lab Number | Wt/Vol Extracted | Extracted Vol | Date | Analyst | Method |
|---|---|---|---|---|---|---|
| General Chemistry Parameters | NTB1515-01 | 300.0 mL | 300.0 mL | 02/18/2010 | MXN | *** DEFAULT PREF |
| General Chemistry Parameters | NTB1515-02 | 300.0 mL | 300.0 mL | 02/18/2010 | MXN | *** DEFAULT PREF |
| General Chemistry Parameters | NTB1515-03 | 300.0 mL | 300.0 mL | 02/18/2010 | MXN | *** DEFAULT PREF |
| General Chemistry Parameters | NTB1515-04 | 300.0 mL | 300.0 mL | 02/18/2010 | MXN | *** DEFAULT PREF |
| General Chemistry Parameters | NTB1515-05 | 300.0 mL | 300.0 mL | 02/18/2010 | MXN | *** DEFAULT PREF |
| General Chemistry Parameters | NTB1515-06 | 300.0 mL | 300.0 mL | 02/18/2010 | MXN | *** DEFAULT PREF |
| General Chemistry Parameters | NTB1515-07 | 300.0 mL | 300.0 mL | 02/18/2010 | MXN | *** DEFAULT PREF |
| General Chemistry Parameters | NTB1515-01 | 1.0 filter | 1.0 filter | 02/18/2010 | SXJ | Filtering |
| General Chemistry Parameters | NTB1515-02 | 1.0 filter | 1.0 filter | 02/18/2010 | SXJ | Filtering |
| General Chemistry Parameters | NTB1515-03 | 1.0 filter | 1.0 filter | 02/18/2010 | SXJ | Filtering |
| General Chemistry Parameters | NTB1515-04 | 1.0 filter | 1.0 filter | 02/18/2010 | SXJ | Filtering |
| General Chemistry Parameters | NTB1515-05 | 1.0 filter | 1.0 filter | 02/18/2010 | SXJ | Filtering |
| General Chemistry Parameters | NTB1515-06 | 1.0 filter | 1.0 filter | 02/18/2010 | SXJ | Filtering |
| General Chemistry Parameters | NTB1515-07 | 1.0 filter | 1.0 filter | 02/18/2010 | SXJ | Filtering |

Client: TestAmerica Tampa
6712 Benjamin Road, Suite 100
Tampa, FL 33634
Attn: Nancy Robertson

Work Order: NTB1515
Project: GHNS Barbados
Project Number: 660-33886

Sampled: 02/16/10
Received: 02/18/10

## PROJECT QUALITY CONTROL DATA
### Blank

| Analyte | Blank Value | Q | Units | Q.C. Batch | Lab Number |
|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | |
| BOD - 5 Day | 2.00 | | mg/L | 10B3734 | 10B3734-BLK1 |
| Chlorophyll-a Uncorrected | 2.00 | U | ug/L | 10B4141 | 10B4141-BLK1 |

## PROJECT QUALITY CONTROL DATA
### Duplicate

| Analyte | Orig. Val. | Duplicate | Q | Units | RPD | RPD Limit | Q.C. Batch | Sample Duplicated |
|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | | |
| BOD - 5 Day | 2.72 | 2.72 | | mg/L | 0 | 20 | 10B3734 | NTB1443-01 |
| Chlorophyll-a Uncorrected | 5.00 | 5.00 | | ug/L | 0 | 50 | 10B4141 | NTB1517-01 |

## PROJECT QUALITY CONTROL DATA
### LCS

| Analyte | Known Val. | Analyzed Val | Q | Units | % Rec. | Target Range | Q.C. Batch |
|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | |
| BOD - 5 Day | 198 | 203 | | mg/L | 103 | 85 - 115 | 10B3734 |
| Chlorophyll-a Uncorrected | 200 | 168 | | ug/L | 84 | 80 - 120 | 10B4141 |

## PROJECT QUALITY CONTROL DATA
### LCS Dup

| Analyte | Orig. Val. | Duplicate | Q | Units | Spike Conc | % Rec. | RPD | RPD Limit | Q.C. Batch | Sample Duplicated |
|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | | | | |
| Chlorophyll-a Uncorrected | | 178 | | ug/L | 200 | 89 | 5 | 50 | 10B4141 | |

**TestAmerica Nashville**
Judith A Beato
Project Manager

| | | | | | |
|---|---|---|---|---|---|
| Client: | TestAmerica Tampa<br>6712 Benjamin Road, Suite 100<br>Tampa, FL 33634 | Work Order:<br>Project:<br>Project Number: | NTB1515<br>GHNS Barbados<br>660-33886 | Sampled:<br>Received: | 02/16/10<br>02/18/10 |
| Attn: | Nancy Robertson | | | | |

## CERTIFICATION SUMMARY

**TestAmerica Nashville**

| Method | Matrix | A2LA | AIHA | Nelac | Florida |
|---|---|---|---|---|---|
| SM 10200H | Water | | | X | X |
| SM 5210B | Water | | N/A | X | X |

**Subcontracted Laboratories**

TestAmerica - Orlando, FL Florida Cert #E83012
8010 Sunport Drive Suite 116 - Orlando, FL 32809

Analysis Performed: BOD 5 Day SM 5210B
Samples: NTB1515-01, NTB1515-02, NTB1515-03, NTB1515-04, NTB1515-05, NTB1515-06, NTB1515-07

Analysis Performed: Chlorophyll-a Uncorrected SM10200H
Samples: NTB1515-01, NTB1515-02, NTB1515-03, NTB1515-04, NTB1515-05, NTB1515-06, NTB1515-07

## DATA QUALIFIERS AND DEFINITIONS

| | |
|---|---|
| **HT3** | Sample received with insufficient holding time remaining for analysis to be performed within the method's holding time requirements. |
| **Q** | Sample analyzed beyond acceptable holding time. |
| **U** | The compound was analyzed for but not detected |

## ADDITIONAL COMMENTS

When insufficient sample volume is received for Matrix Spike and Matrix Spike Duplicate, Laboratory Control Spike and Laboratory Control Spike Duplicate data is used for batch QC.

**TestAmerica Nashville**
Judith A Beato
Project Manager

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

4310 East Anderson Road * Orlando, FL 32812 * 407-851-2560 * Fax: 407-856-0886 * 800-851-

Client: TestAmerica Tampa

Project: NTB1515

Shipped By: Walk-in

Tracking Number:

Cooler Received On: 02/18/10 13:47

And Opened On (Date/time): 2-18-10 / 1347

Received By: Jennifer Batura

Logged in by: Ryan Reich

Were custody seals on the outside of cooler? **YES** ___ **NO** ✓ If Yes # ___ Location ___

Were custody seals intact? **YES** ___ **NO** ___ **N/A** ✓ (no seals present)

Chain of Custody Complete? **YES** ✓ **NO** ___

Discrepancy Comments:

Cooler Temparture When Opened: 2.30 Degrees Celsius

Temparture Blank Included: **YES** ___ **NO** ✓

Packing Material: Bubblewrap ___ NONE ___ [✓ Other:] Plastic

Received on Ice: **YES** ✓ **NO** ___ Other: ___ Total # Of Containers: 14 # Vials ___

Any Bottles Broken? **YES** ___ **NO** ✓ If Yes Which One(s)? ___

Any Missing Samples? **YES** ___ **NO** ✓ If Yes Which One(s)? ___

pH Levels: H2SO4 <=2? ___ HNO3 <=2? ___ HCL <=2? ___ NaOH >=10? ___

# Of Containers Unpreserved between 6 and 8? 14

Any Air Bubbles in VOA Vials? **YES** ___ **NO** ___ **N/A** ✓ (no VOA vials received)

Was there enough sample shipped in each container? **YES** ✓ **NO** ~~✓~~ RR 2-18-10

Correct Preservatives Used? **YES** ✓ **NO** ___ If No, see comments:

Project Manager: Judith A Beato

Corrective Actions Taken

Serial Number NTB1515

## ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

☒ **TestAmerica Tampa**
6712 Benjamin Road, Suite 100
Tampa, FL 33634

Website: www.testamericainc.com
Phone: (813) 885-7427
Fax: (813) 885-7049

○ Alternate Laboratory Name/Location
Phone:
Fax:

PROJECT REFERENCE GHNS
PROJECT NO. 2010001
PROJECT LOCATION (STATE) Barbados
SAMPLER'S SIGNATURE
P.O. NUMBER
CONTRACT NO.
CLIENT (SITE) PM R Pryor
CLIENT PHONE 813-237-3781
CLIENT FAX
CLIENT NAME EEC
CLIENT E-MAIL barbados@eec-tampabay.com
CLIENT ADDRESS Tampa
COMPANY CONTRACTING THIS WORK (if applicable)

PAGE 2 OF 2
STANDARD REPORT DELIVERY ☒
DATE DUE
EXPEDITED REPORT DELIVERY (SURCHARGE) ○
DATE DUE
NUMBER OF COOLERS SUBMITTED PER SHIPMENT:

| SAMPLE DATE | SAMPLE TIME | SAMPLE IDENTIFICATION | COMPOSITE (C) OR GRAB (G) INDICATE | AQUEOUS (WATER) | SOLID OR SEMISOLID | AIR | NONAQUEOUS LIQUID (OIL, SOLVENT....) | CO2 | COD | Sulfide | TSS, Turbidity * | BOD | Herbicides | Organophos Pest | Phosphorus total | MG, NA, CU, FE, PB, K, Mercury | Chlor Pest | Tannins, Lignins | Chlorophyl A | Nitrate, Nitrite, Sulfate, Alkalinity, Chloride * | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2/16/10 | 11:00 | 2A |  | X |  |  |  | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 01 |
| 2/16/10 | 10:00 | 1 |  | X |  |  |  | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 02 |
| 2/16/10 | 12:20 | 3B |  | X |  |  |  | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 03 |
| 2/16/10 | 12:40 | 3A |  | X |  |  |  | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 04 |
| 2/16/10 | 1:50 | 4B |  | X |  |  |  | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 05 |
| 2/16/10 | 1:30 | 5A |  | X |  |  |  | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 06 |
| 2/16/10 | 2:40 | 4D |  | X |  |  |  | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 07 |
| ~~2/16/10~~ | ~~3:30~~ | ~~5B~~ |  | ~~X~~ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

PRESERVATIVE

NUMBER OF CONTAINERS SUBMITTED

*= No Salinity, add Turbidity

| RELINQUISHED BY: (SIGNATURE) | DATE | TIME | RELINQUISHED BY: (SIGNATURE) | DATE | TIME | RELINQUISHED BY: (SIGNATURE) | DATE | TIME |
|---|---|---|---|---|---|---|---|---|
| EMPTY CONTAINERS |  |  |  | 2/16/10 | 10:00 | Barbara Pryor | 2/16/10 | 3:45 |
| **RECEIVED BY: (SIGNATURE)** | **DATE** | **TIME** | **RECEIVED BY: (SIGNATURE)** | **DATE** | **TIME** | **RECEIVED BY: (SIGNATURE)** | **DATE** | **TIME** |
| EMPTY CONTAINERS | 2/10/10 | 2:00PM | Barbara Pryor | 2/16/10 | 10:00 | Stephanie Sutker | 2/18/10 | 1354 |

LABORATORY USE ONLY

| RECEIVED FOR LABORATORY BY (SIGNATURE) | DATE | TIME | CUSTODY INTACT | CUSTODY SEAL NO. | TAMPA LOG NO. | COOLER TEMP UPON RECEIPT | LABORATORY REMARKS |
|---|---|---|---|---|---|---|---|
|  | 2-18-10 | 13:47 | YES ○<br>NO ○ |  |  | 2.3° |  |

TAL8240-660 (0209)

Serial Number

# ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

660-33886

☒ **TestAmerica Tampa**
6712 Benjamin Road, Suite 100
Tampa, FL 33634

Website: www.testamericainc.com
Phone: (813) 885-7427
Fax: (813) 885-7049

○ Alternate Laboratory Name/Location
Phone:
Fax:

PROJECT REFERENCE GHNS
PROJECT NO. 2010001
PROJECT LOCATION (STATE) Barbados
SAMPLER'S SIGNATURE
P.O. NUMBER
CONTRACT NO.
CLIENT (SITE) PM R Pryor
CLIENT PHONE 813-237-3781
CLIENT FAX
CLIENT NAME EEC
CLIENT E-MAIL barbados@eec-tampabay.com
CLIENT ADDRESS Tampa
COMPANY CONTRACTING THIS WORK (if applicable)

PAGE 1 OF 2

STANDARD REPORT DELIVERY ☒
DATE DUE
EXPEDITED REPORT DELIVERY (SURCHARGE) ○
DATE DUE
NUMBER OF COOLERS SUBMITTED PER SHIPMENT:

PRESERVATIVE

| SAMPLE DATE | SAMPLE TIME | SAMPLE IDENTIFICATION | COMPOSITE (C) OR GRAB (G) INDICATE | AQUEOUS (WATER) | SOLID OR SEMISOLID | AIR | NONAQUEOUS LIQUID (OIL, SOLVENT....) | Chlor Pest | ICP Metals Mercury | Nitrate, Nitrite, Sulphate, orthophos. | Sulfide, phosphorus, Ammonia | TOC | Herbicides | organo phosphorus Pest | Sulfide | Phosphorus Ammonia | Nitrate Sulfate | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2/16/10 | 11:10 | 2A | | | X | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | |
| 2/16/10 | 10:10 | 1 | | | X | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | |
| 2/16/10 | 7:00 | 3A | | | X | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | |
| 2/16/10 | 2:00 | 4B | | | X | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | |
| 2/16/10 | 3:30 | 5B | | X | | | | 1 | 1 | 1 | ~~[illegible]~~ | 3 | < | 1 | 1 | 1 | 1 | |

NUMBER OF CONTAINERS SUBMITTED

| RELINQUISHED BY: (SIGNATURE) | DATE | TIME | RELINQUISHED BY: (SIGNATURE) | DATE | TIME | RELINQUISHED BY: (SIGNATURE) | DATE | TIME |
|---|---|---|---|---|---|---|---|---|
| EMPTY CONTAINERS | | | | 2/16/10 | 10:00 | Barbara Pryor | 2/16/10 | 3:45 |

| RECEIVED BY: (SIGNATURE) | DATE | TIME | RECEIVED BY: (SIGNATURE) | DATE | TIME | RECEIVED BY: (SIGNATURE) | DATE | TIME |
|---|---|---|---|---|---|---|---|---|
| EMPTY CONTAINERS | 2/10/10 | 2:00PM | Barbara Pryor | 2/16/10 | 10:00 | | | |

LABORATORY USE ONLY

| RECEIVED FOR LABORATORY BY: (SIGNATURE) | DATE | TIME | CUSTODY INTACT | CUSTODY SEAL NO. | TAMPA LOG NO. | COOLER TEMP. UPON RECEIPT | LABORATORY REMARKS |
|---|---|---|---|---|---|---|---|
| Amanda Hamison | 2/18/10 | 0905 | YES ○<br>NO ○ | | 660 33886 | 1.5, 1.3, 2.8, 1.2, 2.6, 5, 1.2, 1.4, 2.2, 2.9°c CU-07 | |

TAL8240-660 (0209)

Serial Number

## ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

660-33886

☒ **TestAmerica Tampa**
6712 Benjamin Road, Suite 100
Tampa, FL 33634

Website: www.testamericainc.com
Phone: (813) 885-7427
Fax: (813) 885-7049

○ Alternate Laboratory Name/Location
Phone:
Fax:

PROJECT REFERENCE GHNS
PROJECT NO. 2010001
PROJECT LOCATION (STATE) Barbados
SAMPLER'S SIGNATURE
P.O. NUMBER
CONTRACT NO.
CLIENT (SITE) PM R Pryor
CLIENT PHONE 813-237-3781
CLIENT FAX
CLIENT NAME EEC
CLIENT E-MAIL barbados@eec-tampabay.com
CLIENT ADDRESS Tampa
COMPANY CONTRACTING THIS WORK (if applicable)

PAGE 2 OF 2
STANDARD REPORT DELIVERY ☒
DATE DUE
EXPEDITED REPORT DELIVERY (SURCHARGE) ○
DATE DUE
NUMBER OF COOLERS SUBMITTED PER SHIPMENT:

REQUIRED ANALYSIS / NUMBER OF CONTAINERS SUBMITTED

| SAMPLE DATE | SAMPLE TIME | SAMPLE IDENTIFICATION | COMPOSITE (C) OR GRAB (G) INDICATE | AQUEOUS (WATER) | SOLID OR SEMISOLID | AIR | NONAQUEOUS LIQUID (OIL, SOLVENT....) | CO2 | COD | Sulfide | TSS, Turbidity | BOD | Herbicides | Organophos Pest | Phosphorus Total | MG, NA, CU, FE, PB, K; Mercury | Chlor Pest | Tannins, Lignins | Chlorophyll A | Nitrate, Nitrite; Sulfate, Alkalinity; Chloride | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRESERVATIVE | | | | | | | | | | | * | | | | | | | | | X | |
| 2/16/10 | 11:00 | 2A | | X | | | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 2/16/10 | 10:00 | 1 | | X | | | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 2/16/10 | 12:20 | 3B | | X | | | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 2/16/10 | 12:40 | 3A | | X | | | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 2/16/10 | 1:50 | 4B | | X | | | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 2/16/10 | 1:30 | 5A | | X | | | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 2/16/10 | 2:40 | 4D | | X | | | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| ~~2/16/10~~ | ~~3:30~~ | ~~3B Blank~~ | | ~~X~~ | | | | | | | | | | | | | | | | | |

* = No Salinity, add Turbidity

| RELINQUISHED BY: (SIGNATURE) | DATE | TIME | RELINQUISHED BY: (SIGNATURE) | DATE | TIME | RELINQUISHED BY: (SIGNATURE) | DATE | TIME |
|---|---|---|---|---|---|---|---|---|
| EMPTY CONTAINERS | | | | 2/16/10 | 10:00 | Barbara Pryor | 2/16/10 | 3:45 |
| **RECEIVED BY: (SIGNATURE)** | **DATE** | **TIME** | **RECEIVED BY: (SIGNATURE)** | **DATE** | **TIME** | **RECEIVED BY: (SIGNATURE)** | **DATE** | **TIME** |
| EMPTY CONTAINERS | 2/10/10 | 2:00PM | Barbara Pryor | 2/16/10 | 10:00 | | | |

LABORATORY USE ONLY

| RECEIVED FOR LABORATORY BY: (SIGNATURE) | DATE | TIME | CUSTODY INTACT | CUSTODY SEAL NO. | TAMPA LOG NO. | COOLER TEMP. UPON RECEIPT | LABORATORY REMARKS |
|---|---|---|---|---|---|---|---|
| Amanda Jamison | 2/19/10 | 0905 | YES ○<br>NO ○ | | 660-33886 | 1.5, 1.3, 2.8, 1.7, 2.6, 3.1, 1.2, 1.4, 2.2, 2.9 °c | CU-07 |

TAL8240-660 (0209)

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

# PRESERVATION CONFIRMATION FORM

Tampa, FL

JOB NUMBER: 660-33886 Logged in TALS By : Amanda Harrison

Cooler Received on (date) 2-18-10 And Opened By (full name): Charles Voltz

1. Shipper (circle one) [✓ FEDEX] UPS DHL WALK-IN COURIER OTHER: ______

2. Tracking # ______

3. Temperature of rep. sample or temp blank when opened: ______ *Degrees Celsius*

4. Number of H2SO4 (sulfuric acid) preserved containers: 15

   All containers pH < 2 ? yes If not please comment below:

5. Number of HCL (hydrochloric acid) preserved containers: ______

   All containers pH < 2 ? ______ If not please comment below:

6. Number of HNO3 (nitric acid) preserved containers: 8

   All containers pH < 2 ? NO If not please comment below:

   CV 2-18-10

   1A, 3B, 4B, ~~[illegible]~~ 2A, Ph=4 4D Ph=3

7. Number of NaOH (sodium hydroxide) preserved containers: 6

   All containers pH >12 ? NO If not please comment below:

   1A, 3B, 4B, 4D, 2A, 5A Ph=11

8. Number of Unpreserved containers: 60

   All containers pH between 6 and 8? yes If not please comment below:

9. Was chlorine present in any of the unpreserved containers? NO

   If yes, which samples? ______

**pH Strip Lot#:** 10B105 **Chlorine Strip Lot# :** 9259

Revision 2- 02/04/10

FWI-CU-002:02.04.10:2

# Login Sample Receipt Check List

Client: Environmental Engineering Consultant
Job Number: 660-33886-1

**Login Number: 33886**
**List Source: TestAmerica Tampa**
**Creator: Harrison, Amanda**
**List Number: 1**

| Question | T / F/ NA | Comment |
|---|---|---|
| Radioactivity either was not measured or, if measured, is at or below background | N/A | |
| The cooler's custody seal, if present, is intact. | True | |
| The cooler or samples do not appear to have been compromised or tampered with. | True | |
| Samples were received on ice. | True | |
| Cooler Temperature is acceptable. | True | |
| Cooler Temperature is recorded. | True | see receipt info page (bottom) for temps |
| COC is present. | True | |
| COC is filled out in ink and legible. | True | |
| COC is filled out with all pertinent information. | True | |
| There are no discrepancies between the sample IDs on the containers and the COC. | True | |
| Samples are received within Holding Time. | True | |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | |
| Sample collection date/times are provided. | True | |
| Appropriate sample containers are used. | True | |
| Sample bottles are completely filled. | True | |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs | False | minimal volume received for 8081, 8141, and 8151 for sample SB |
| VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter. | True | |
| If necessary, staff have been informed of any short hold time or quick TAT needs | True | |
| Multiphasic samples are not present. | True | |
| Samples do not require splitting or compositing. | True | |
| Is the Field Sampler's name present on COC? | True | |
| Sample Preservation Verified | True | |

# Login Sample Receipt Check List

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Login Number: 33886**
**Creator: Hor, Koma**
**List Number: 1**

**List Source: TestAmerica Pensacola**
**List Creation: 02/19/10 11:37 AM**

| Question | T / F/ NA | Comment |
|---|---|---|
| Radioactivity either was not measured or, if measured, is at or below background | N/A | |
| The cooler's custody seal, if present, is intact. | True | |
| The cooler or samples do not appear to have been compromised or tampered with. | True | |
| Samples were received on ice. | True | |
| Cooler Temperature is acceptable. | True | |
| Cooler Temperature is recorded. | True | 1.4°C |
| COC is present. | True | |
| COC is filled out in ink and legible. | True | |
| COC is filled out with all pertinent information. | True | |
| There are no discrepancies between the sample IDs on the containers and the COC. | True | |
| Samples are received within Holding Time. | True | |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | |
| Sample collection date/times are provided. | True | |
| Appropriate sample containers are used. | True | |
| Sample bottles are completely filled. | True | |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs | True | |
| VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter. | True | |
| If necessary, staff have been informed of any short hold time or quick TAT needs | True | |
| Multiphasic samples are not present. | True | |
| Samples do not require splitting or compositing. | True | |
| Is the Field Sampler's name present on COC? | True | |
| Sample Preservation Verified | True | |

# Login Sample Receipt Check List

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Login Number: 33886**
**Creator: Conner, Keaton**
**List Number: 1**

**List Source: TestAmerica Savannah**
**List Creation: 02/19/10 09:39 AM**

| Question | T / F/ NA | Comment |
|---|---|---|
| Radioactivity either was not measured or, if measured, is at or below background | N/A | |
| The cooler's custody seal, if present, is intact. | True | |
| The cooler or samples do not appear to have been compromised or tampered with. | True | |
| Samples were received on ice. | True | |
| Cooler Temperature is acceptable. | True | |
| Cooler Temperature is recorded. | True | |
| COC is present. | True | |
| COC is filled out in ink and legible. | True | |
| COC is filled out with all pertinent information. | True | |
| There are no discrepancies between the sample IDs on the containers and the COC. | True | |
| Samples are received within Holding Time. | True | |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | |
| Sample collection date/times are provided. | True | |
| Appropriate sample containers are used. | True | |
| Sample bottles are completely filled. | True | |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs | True | |
| VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter. | N/A | |
| If necessary, staff have been informed of any short hold time or quick TAT needs | True | |
| Multiphasic samples are not present. | N/A | |
| Samples do not require splitting or compositing. | N/A | |
| Is the Field Sampler's name present on COC? | False | |
| Sample Preservation Verified | True | |

# Login Sample Receipt Check List

Client: Environmental Engineering Consultant

Job Number: 660-33886-1

**Login Number: 33886**
**Creator: Alsheimer, Carl**
**List Number: 1**

**List Source: TestAmerica Tallahassee**
**List Creation: 02/19/10 08:58 AM**

| Question | T / F/ NA | Comment |
|---|---|---|
| Radioactivity either was not measured or, if measured, is at or below background | N/A | |
| The cooler's custody seal, if present, is intact. | True | |
| The cooler or samples do not appear to have been compromised or tampered with. | True | |
| Samples were received on ice. | True | |
| Cooler Temperature is acceptable. | True | |
| Cooler Temperature is recorded. | True | |
| COC is present. | True | |
| COC is filled out in ink and legible. | True | |
| COC is filled out with all pertinent information. | True | |
| There are no discrepancies between the sample IDs on the containers and the COC. | True | |
| Samples are received within Holding Time. | True | |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | |
| Sample collection date/times are provided. | True | |
| Appropriate sample containers are used. | True | |
| Sample bottles are completely filled. | True | |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs | True | |
| VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter. | N/A | |
| If necessary, staff have been informed of any short hold time or quick TAT needs | True | |
| Multiphasic samples are not present. | N/A | |
| Samples do not require splitting or compositing. | N/A | |
| Is the Field Sampler's name present on COC? | True | |
| Sample Preservation Verified | True | |

# ANALYTICAL REPORT

Job Number: 660-33914-1

Job Description: GHNS Barbados

For:
Environmental Engineering Consultant
5119 N. Florida Avenue
Tampa, FL  33603

Attention: Mr. Richard Pryor

Approved for release.
Nancy Robertson
Project Manager II
4/6/2010 11:53 AM

Nancy Robertson
Project Manager II
nancy.robertson@testamericainc.com
04/06/2010
Revision: 1

Methods: FDEP, DOH Certification #:  TestAmerica Tampa E84282, TestAmerica Tallahassee E81005, TestAmerica Orlando E83012, TestAmerica Savannah E87052, TestAmerica Pensacola E81010

These test results meet all the requirements of NELAC unless specified in the case narrative. All questions regarding this test report should be directed to the TestAmerica Project Manager who signed this test report.  The estimated uncertainty associated with these reported results is available upon request.  The results contained in this test report relate only to these samples included herein.

**TestAmerica Laboratories, Inc.**
TestAmerica Tampa   6712 Benjamin Road, Suite 100, Tampa, FL  33634
Tel (813) 885-7427  Fax (813) 885-7049  www.testamericainc.com

# Job Narrative
## 660-33914-1

**Comments**
No additional comments.

**Receipt**
All samples were received in good condition within temperature requirements.

**GC Semi VOA**
Method 8081A: Per TA SOP, at least one of surrogate recoveries was in control on sample 4F. The sample is flagged with J1.

Method 8081A: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 90901 and 90902 were outside of control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria. Sample 7A is flagged with J3.

Method 8141A: Surrogate recovery for sample 4F was outside of acceptance limits. There was insufficient sample to perform a re-extraction; therefore, the data have been reported.

Method 8141: The laboratory control sample (LCS) for batch 640-65857 was outside of control limits for monochrotophos. The laboratories SOP allows for 3/20 analytes to recover outside of limits when a full analyte spike is run. The data are flagged with J3 qualifiers.

Method 8141: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 640-65855 were outside of control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria. The data are flagged with J3 qualifiers.

Method 8151A: The surrogate recovery for samples 4F and 10 were outside control limits bias high. The samples were non detect and are flagged with J1.

Method 8151A: The laboratory control sample / laboratory control sample duplicate (LCS/LCSD) for batch 90999 was outside of control limits for dalapon and MCPA. The laboratories SOP allows for 3/20 analytes to recover outside of limits when a full analyte spike is run. The data are flagged with J3 qualifiers.

Method 8151A: The laboratory control sample (LCS) for batch 91923 was outside control limits for dinoseb. The laboratories SOP allows for 3/20 analytes to recover outside of limits when a full analyte spike is run. The data are flagged with J3 qualifiers.

Method 8151A: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 91293 were outside of control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria. Sample 7A is flagged with J3.

No other analytical or quality issues were noted.

**Metals**
Method 6010B: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 90981were outside of control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria. The data are flagged with J3 qualifiers.

No other analytical or quality issues were noted.

**RSK-175**
The Method Blank contained an estimated result between the MDL and PQL for Carbon dioxide.
The samples are flagged with V.

**General Chemistry**
Method 353.2 Nitrate, Nitrite: The samples were received with greater than 50% of holding time expired. . As such, the laboratory had insufficient time remaining to perform the analysis within holding time for sample 4F and Surface Water Blank. The data are flagged with Q qualifiers for this sample.

Method 180.1 Turbididty: The samples were received with greater than 50% of holding time expired. . As such, the laboratory had insufficient time remaining to perform the analysis within holding time for sample 4F and Surface Water Blank. The data are flagged with Q qualifiers for this sample.

Method SM 5210B BOD: The samples were received with greater than 50% of holding time expired. As such, the laboratory had insufficient time remaining to perform the analysis within holding time. The data are flagged with Q qualifiers except for samples 7A and 7B.

Method 10200H Chlorophyll-a: The samples were received with greater than 50% of holding time expired. As such, the laboratory had insufficient time remaining to perform the analysis within holding time. The data are flagged with Q qualifiers except for samples 7A and

7B.

Method 350.1: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 680-161659 were outside of control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria. The data are flagged with J3 qualifiers.

Method 353.2: The matrix spike duplicate (MSD) recovery for batch 91350 was outside control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria. The data are flagged with J3 qualifiers.

Method SM 5220D: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 91051 were outside control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria.
Sample 10 is flagged with J3.

Method SM 5220D: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 91053 were outside control limits due to the high concentration of analyte in the sample. The associated laboratory control sample (LCS) recovery met acceptance criteria. Sample 4F is flagged with J3.

Method SM 5550B: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 680-161926 were outside control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria. The data are flagged with J3 qualifiers.

No other analytical or quality issues were noted.

# EXECUTIVE SUMMARY - Detections

Client: Environmental Engineering Consultant Job Number: 660-33914-1

| Lab Sample ID Client Sample ID<br>Analyte | Result / Qualifier | | Reporting Limit | Units | Method |
|---|---|---|---|---|---|
| **660-33914-1 4F** | | | | | |
| Carbon dioxide (as CO2) | 310 | V | 50 | ug/L | RSK-175 |
| Malathion | 0.25 | I | 0.94 | ug/L | 8141A |
| Turbidity | 280 | Q | 5.0 | NTU | 180.1 |
| Phosphorus, Total | 1.3 | | 0.30 | mg/L | 365.4 |
| Chlorophyll a | 98.9 | Q | 2.00 | ug/L | SM 10200H |
| Alkalinity | 160 | | 1.0 | mg/L | SM 2320B |
| Total Suspended Solids | 110 | | 1.7 | mg/L | SM 2540D |
| Chloride | 150 | | 10 | mg/L | SM 4500 Cl- E |
| Sulfide | 5.3 | | 1.0 | mg/L | SM 4500 S2 F |
| Biochemical Oxygen Demand | 88.8 | Q | 2.00 | mg/L | SM 5210B |
| Chemical Oxygen Demand | 460 | J3 | 20 | mg/L | SM 5220D |
| Tannins and Lignins | 5.9 | | 1.0 | mg/L | SM 5550B |
| ***Total Recoverable*** | | | | | |
| Copper | 0.018 | | 0.010 | mg/L | 6010B |
| Iron | 1.4 | | 0.20 | mg/L | 6010B |
| Potassium | 8.6 | | 1.0 | mg/L | 6010B |
| Magnesium | 9.6 | | 0.080 | mg/L | 6010B |
| Sodium | 100 | | 5.0 | mg/L | 6010B |
| Lead | 0.0069 | I | 0.010 | mg/L | 6010B |
| Zinc | 0.056 | | 0.020 | mg/L | 6010B |
| **660-33914-2 4E** | | | | | |
| Carbon dioxide (as CO2) | 130 | V | 50 | ug/L | RSK-175 |
| Turbidity | 17 | | 0.10 | NTU | 180.1 |
| Phosphorus, Total | 0.21 | I | 0.30 | mg/L | 365.4 |
| Chlorophyll a | 3.20 | Q | 2.00 | ug/L | SM 10200H |
| Alkalinity | 430 | | 1.0 | mg/L | SM 2320B |
| Total Suspended Solids | 44 | | 1.0 | mg/L | SM 2540D |
| Sulfate | 88 | | 25 | mg/L | SM 426C |
| Chloride | 490 | | 50 | mg/L | SM 4500 Cl- E |
| Biochemical Oxygen Demand | 3.60 | Q | 2.00 | mg/L | SM 5210B |
| Chemical Oxygen Demand | 41 | | 20 | mg/L | SM 5220D |
| Tannins and Lignins | 1.5 | | 0.10 | mg/L | SM 5550B |
| ***Total Recoverable*** | | | | | |
| Iron | 0.38 | | 0.20 | mg/L | 6010B |
| Potassium | 25 | | 1.0 | mg/L | 6010B |
| Magnesium | 66 | | 0.080 | mg/L | 6010B |
| Sodium | 300 | | 5.0 | mg/L | 6010B |
| Lead | 0.0036 | I | 0.010 | mg/L | 6010B |
| Zinc | 0.016 | I | 0.020 | mg/L | 6010B |

# EXECUTIVE SUMMARY - Detections

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

| Lab Sample ID Client Sample ID Analyte | Result / Qualifier | | Reporting Limit | Units | Method |
|---|---|---|---|---|---|
| **660-33914-3 4C** | | | | | |
| Carbon dioxide (as CO2) | 410 | V | 50 | ug/L | RSK-175 |
| Turbidity | 11 | | 0.10 | NTU | 180.1 |
| Phosphorus, Total | 0.21 | I | 0.30 | mg/L | 365.4 |
| Chlorophyll a | 91.8 | Q | 2.00 | ug/L | SM 10200H |
| Alkalinity | 530 | | 1.0 | mg/L | SM 2320B |
| Total Suspended Solids | 8.8 | | 1.0 | mg/L | SM 2540D |
| Sulfate | 62 | | 10 | mg/L | SM 426C |
| Chloride | 510 | | 50 | mg/L | SM 4500 Cl- E |
| Sulfide | 1.1 | | 1.0 | mg/L | SM 4500 S2 F |
| Biochemical Oxygen Demand | 10.3 | Q | 2.00 | mg/L | SM 5210B |
| Chemical Oxygen Demand | 56 | | 20 | mg/L | SM 5220D |
| Tannins and Lignins | 3.0 | | 0.50 | mg/L | SM 5550B |
| ***Total Recoverable*** | | | | | |
| Iron | 0.063 | I | 0.20 | mg/L | 6010B |
| Potassium | 30 | | 1.0 | mg/L | 6010B |
| Magnesium | 63 | | 0.080 | mg/L | 6010B |
| Sodium | 320 | | 5.0 | mg/L | 6010B |
| Zinc | 0.0097 | I | 0.020 | mg/L | 6010B |
| **660-33914-4 10** | | | | | |
| Carbon dioxide (as CO2) | 42 | I V | 50 | ug/L | RSK-175 |
| Turbidity | 4.1 | | 0.10 | NTU | 180.1 |
| Chlorophyll a | 15.0 | Q | 2.00 | ug/L | SM 10200H |
| Alkalinity | 440 | | 1.0 | mg/L | SM 2320B |
| Salinity | 2.5 | | 2.0 | ppt | SM 2520B |
| Total Suspended Solids | 8.0 | | 1.0 | mg/L | SM 2540D |
| Sulfate | 150 | | 25 | mg/L | SM 426C |
| Chloride | 1200 | | 100 | mg/L | SM 4500 Cl- E |
| Biochemical Oxygen Demand | 2.95 | Q | 2.00 | mg/L | SM 5210B |
| Chemical Oxygen Demand | 49 | J3 | 20 | mg/L | SM 5220D |
| Tannins and Lignins | 1.6 | | 0.10 | mg/L | SM 5550B |
| ***Total Recoverable*** | | | | | |
| Iron | 0.075 | I | 0.20 | mg/L | 6010B |
| Potassium | 32 | | 10 | mg/L | 6010B |
| Magnesium | 97 | | 0.080 | mg/L | 6010B |
| Sodium | 590 | | 5.0 | mg/L | 6010B |
| Zinc | 0.0078 | I | 0.020 | mg/L | 6010B |

# EXECUTIVE SUMMARY - Detections

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

| Lab Sample ID Client Sample ID<br>Analyte | Result / Qualifier | | Reporting Limit | Units | Method |
|---|---|---|---|---|---|
| **660-33914-5 7A** | | | | | |
| Carbon dioxide (as CO2) | 54 | V | 50 | ug/L | RSK-175 |
| Turbidity | 4.6 | | 0.10 | NTU | 180.1 |
| Phosphorus, Total | 0.11 | I | 0.30 | mg/L | 365.4 |
| Chlorophyll a | 37.2 | | 2.00 | ug/L | SM 10200H |
| Alkalinity | 420 | | 1.0 | mg/L | SM 2320B |
| Salinity | 2.5 | | 2.0 | ppt | SM 2520B |
| Total Suspended Solids | 11 | | 1.0 | mg/L | SM 2540D |
| Sulfate | 160 | | 25 | mg/L | SM 426C |
| Chloride | 1100 | | 100 | mg/L | SM 4500 Cl- E |
| Biochemical Oxygen Demand | 4.20 | | 2.00 | mg/L | SM 5210B |
| Chemical Oxygen Demand | 51 | | 20 | mg/L | SM 5220D |
| Tannins and Lignins | 1.6 | | 0.10 | mg/L | SM 5550B |
| ***Total Recoverable*** | | | | | |
| Iron | 0.11 | I | 0.20 | mg/L | 6010B |
| Potassium | 31 | | 10 | mg/L | 6010B |
| Magnesium | 96 | | 0.080 | mg/L | 6010B |
| Sodium | 580 | | 5.0 | mg/L | 6010B |
| Zinc | 0.0082 | I | 0.020 | mg/L | 6010B |
| **660-33914-6 7B** | | | | | |
| Carbon dioxide (as CO2) | 36 | I V | 50 | ug/L | RSK-175 |
| Turbidity | 2.7 | | 0.10 | NTU | 180.1 |
| Chlorophyll a | 24.2 | | 2.00 | ug/L | SM 10200H |
| Alkalinity | 440 | | 1.0 | mg/L | SM 2320B |
| Salinity | 2.5 | | 2.0 | ppt | SM 2520B |
| Total Suspended Solids | 9.6 | | 1.0 | mg/L | SM 2540D |
| Sulfate | 140 | | 25 | mg/L | SM 426C |
| Chloride | 1000 | | 100 | mg/L | SM 4500 Cl- E |
| Biochemical Oxygen Demand | 3.93 | | 2.00 | mg/L | SM 5210B |
| Chemical Oxygen Demand | 48 | | 20 | mg/L | SM 5220D |
| Tannins and Lignins | 1.5 | | 0.10 | mg/L | SM 5550B |
| ***Total Recoverable*** | | | | | |
| Iron | 0.067 | I | 0.20 | mg/L | 6010B |
| Potassium | 32 | | 10 | mg/L | 6010B |
| Magnesium | 97 | | 0.080 | mg/L | 6010B |
| Sodium | 590 | | 5.0 | mg/L | 6010B |
| Zinc | 0.0093 | I | 0.020 | mg/L | 6010B |

# EXECUTIVE SUMMARY - Detections

Client: Environmental Engineering Consultant | Job Number: 660-33914-1

| Lab Sample ID / Analyte | Client Sample ID | Result / Qualifier | | Reporting Limit | Units | Method |
|---|---|---|---|---|---|---|
| **660-33914-7** | **SURFACE WATER BLANK** | | | | | |
| Carbon dioxide (as CO2) | | 120 | V | 50 | ug/L | RSK-175 |
| Ammonia (as N) | | 0.072 | | 0.020 | mg/L | 350.1 |
| Nitrate as N | | 3.3 | Q | 0.50 | mg/L | 353.2 |
| Chlorophyll a | | 2.00 | Q,U | 2.00 | ug/L | SM 10200H |
| Alkalinity | | 33 | | 1.0 | mg/L | SM 2320B |
| Chloride | | 12 | | 5.0 | mg/L | SM 4500 Cl- E |
| Biochemical Oxygen Demand | | 2.00 | Q,U | 2.00 | mg/L | SM 5210B |
| ***Total Recoverable*** | | | | | | |
| Sodium | | 9.7 | | 0.50 | mg/L | 6010B |
| **660-33914-8** | **4F** | | | | | |
| Chlordane (technical) | | 85 | | 17 | ug/Kg | 8081A |
| Dieldrin | | 1.4 | I | 1.7 | ug/Kg | 8081A |
| Heptachlor epoxide | | 0.17 | I | 2.0 | ug/Kg | 8081A |
| Aluminum | | 3200 | | 78 | mg/Kg | 6010B |
| Arsenic | | 1.6 | I | 1.9 | mg/Kg | 6010B |
| Boron | | 8.7 | I | 19 | mg/Kg | 6010B |
| Barium | | 26 | | 3.9 | mg/Kg | 6010B |
| Calcium | | 210000 | | 970 | mg/Kg | 6010B |
| Cobalt | | 1.3 | I | 3.9 | mg/Kg | 6010B |
| Chromium | | 9.2 | | 3.9 | mg/Kg | 6010B |
| Copper | | 23 | | 7.8 | mg/Kg | 6010B |
| Iron | | 2900 | | 19 | mg/Kg | 6010B |
| Magnesium | | 3300 | | 190 | mg/Kg | 6010B |
| Manganese | | 65 | | 3.9 | mg/Kg | 6010B |
| Sodium | | 970 | | 190 | mg/Kg | 6010B |
| Lead | | 33 | | 1.9 | mg/Kg | 6010B |
| Strontium | | 2000 | | 19 | mg/Kg | 6010B |
| Titanium | | 27 | | 3.9 | mg/Kg | 6010B |
| Vanadium | | 6.4 | | 3.9 | mg/Kg | 6010B |
| Zinc | | 94 | | 7.8 | mg/Kg | 6010B |
| Mercury | | 0.015 | I | 0.015 | mg/Kg | 7471A |
| Ammonia (as N) | | 9.3 | | 0.60 | mg/Kg | 350.1 |
| Phosphorus | | 1300 | | 40 | mg/Kg | 365.4 |
| Sulfide | | 240 | | 25 | mg/Kg | 9034 |
| Total Organic Carbon | | 22000 | | 3000 | mg/Kg | 9060 |
| Percent Solids | | 68 | | 0.10 | % | Moisture |
| ***Soluble*** | | | | | | |
| Sulfate-Soluble | | 620 | | 97 | mg/Kg | 9038 |
| pH-Soluble | | 7.50 | Q | 1.00 | SU | 9045C |
| Orthophosphate-Soluble | | 3.1 | | 3.0 | mg/L | SM 4500 P E |

# EXECUTIVE SUMMARY - Detections

Client: Environmental Engineering Consultant                                   Job Number: 660-33914-1

| Lab Sample ID / Analyte | Client Sample ID | Result | Qualifier | Reporting Limit | Units | Method |
|---|---|---|---|---|---|---|
| **660-33914-9** | **4E** | | | | | |
| 4,4'-DDE | | 0.51 | I | 3.3 | ug/Kg | 8081A |
| Dieldrin | | 0.42 | I | 1.7 | ug/Kg | 8081A |
| Aluminum | | 3200 | | 77 | mg/Kg | 6010B |
| Arsenic | | 1.1 | I | 1.9 | mg/Kg | 6010B |
| Boron | | 12 | I | 19 | mg/Kg | 6010B |
| Barium | | 15 | | 3.8 | mg/Kg | 6010B |
| Calcium | | 150000 | | 960 | mg/Kg | 6010B |
| Cobalt | | 0.82 | I | 3.8 | mg/Kg | 6010B |
| Chromium | | 4.8 | | 3.8 | mg/Kg | 6010B |
| Copper | | 12 | | 7.7 | mg/Kg | 6010B |
| Iron | | 2600 | | 19 | mg/Kg | 6010B |
| Magnesium | | 4200 | | 190 | mg/Kg | 6010B |
| Manganese | | 44 | | 3.8 | mg/Kg | 6010B |
| Sodium | | 1300 | | 190 | mg/Kg | 6010B |
| Lead | | 53 | | 1.9 | mg/Kg | 6010B |
| Strontium | | 2200 | | 19 | mg/Kg | 6010B |
| Titanium | | 40 | | 3.8 | mg/Kg | 6010B |
| Vanadium | | 5.4 | | 3.8 | mg/Kg | 6010B |
| Zinc | | 74 | | 7.7 | mg/Kg | 6010B |
| Mercury | | 0.016 | I | 0.016 | mg/Kg | 7471A |
| Ammonia (as N) | | 30 | | 1.5 | mg/Kg | 350.1 |
| Phosphorus | | 630 | | 18 | mg/Kg | 365.4 |
| Sulfide | | 30 | | 25 | mg/Kg | 9034 |
| Total Organic Carbon | | 31000 | | 3000 | mg/Kg | 9060 |
| Percent Solids | | 49 | | 0.10 | % | Moisture |
| ***Soluble*** | | | | | | |
| Nitrate as N-Soluble | | 1.4 | I | 5.0 | mg/Kg | 353.2 |
| pH-Soluble | | 7.73 | Q | 1.00 | SU | 9045C |
| Orthophosphate-Soluble | | 2.6 | I | 3.0 | mg/L | SM 4500 P E |

# EXECUTIVE SUMMARY - Detections

Client: Environmental Engineering Consultant Job Number: 660-33914-1

| Lab Sample ID Analyte | Client Sample ID | Result / Qualifier | | Reporting Limit | Units | Method |
|---|---|---|---|---|---|---|
| **660-33914-10** | **10** | | | | | |
| Aluminum | | 1200 | | 20 | mg/Kg | 6010B |
| Arsenic | | 0.44 | I | 0.49 | mg/Kg | 6010B |
| Boron | | 5.4 | | 4.9 | mg/Kg | 6010B |
| Barium | | 5.2 | | 0.98 | mg/Kg | 6010B |
| Calcium | | 14000 | | 49 | mg/Kg | 6010B |
| Cobalt | | 0.25 | I | 0.98 | mg/Kg | 6010B |
| Chromium | | 1.1 | | 0.98 | mg/Kg | 6010B |
| Copper | | 3.6 | | 2.0 | mg/Kg | 6010B |
| Iron | | 850 | | 4.9 | mg/Kg | 6010B |
| Magnesium | | 1300 | | 49 | mg/Kg | 6010B |
| Manganese | | 21 | | 0.98 | mg/Kg | 6010B |
| Sodium | | 960 | | 49 | mg/Kg | 6010B |
| Lead | | 16 | | 0.49 | mg/Kg | 6010B |
| Strontium | | 660 | | 9.8 | mg/Kg | 6010B |
| Titanium | | 27 | | 0.98 | mg/Kg | 6010B |
| Vanadium | | 2.9 | | 0.98 | mg/Kg | 6010B |
| Zinc | | 8.2 | | 2.0 | mg/Kg | 6010B |
| Ammonia (as N) | | 35 | | 1.5 | mg/Kg | 350.1 |
| Phosphorus | | 220 | | 17 | mg/Kg | 365.4 |
| Total Organic Carbon | | 140000 | | 3000 | mg/Kg | 9060 |
| Percent Solids | | 9.8 | | 0.10 | % | Moisture |
| ***Soluble*** | | | | | | |
| pH-Soluble | | 7.45 | Q | 1.00 | SU | 9045C |
| Orthophosphate-Soluble | | 3.9 | | 3.0 | mg/L | SM 4500 P E |

# EXECUTIVE SUMMARY - Detections

Client: Environmental Engineering Consultant | Job Number: 660-33914-1

| Lab Sample ID Client Sample ID<br>Analyte | Result / Qualifier | | Reporting Limit | Units | Method |
|---|---|---|---|---|---|
| **660-33914-11 7A** | | | | | |
| Aluminum | 1200 | | 78 | mg/Kg | 6010B |
| Boron | 8.0 | I | 19 | mg/Kg | 6010B |
| Barium | 5.8 | | 3.9 | mg/Kg | 6010B |
| Calcium | 160000 | | 970 | mg/Kg | 6010B |
| Chromium | 1.7 | I | 3.9 | mg/Kg | 6010B |
| Copper | 2.7 | I | 7.8 | mg/Kg | 6010B |
| Iron | 860 | | 19 | mg/Kg | 6010B |
| Magnesium | 1700 | | 190 | mg/Kg | 6010B |
| Manganese | 27 | | 3.9 | mg/Kg | 6010B |
| Sodium | 1500 | | 190 | mg/Kg | 6010B |
| Lead | 5.2 | | 1.9 | mg/Kg | 6010B |
| Strontium | 2000 | | 19 | mg/Kg | 6010B |
| Titanium | 3.4 | I | 3.9 | mg/Kg | 6010B |
| Vanadium | 2.2 | I | 3.9 | mg/Kg | 6010B |
| Zinc | 6.2 | I | 7.8 | mg/Kg | 6010B |
| Ammonia (as N) | 8.8 | | 0.30 | mg/Kg | 350.1 |
| Phosphorus | 270 | | 16 | mg/Kg | 365.4 |
| Total Organic Carbon | 30000 | | 3000 | mg/Kg | 9060 |
| Percent Solids | 41 | | 0.10 | % | Moisture |
| ***Soluble*** | | | | | |
| pH-Soluble | 7.51 | Q | 1.00 | SU | 9045C |
| Orthophosphate-Soluble | 0.91 | I | 3.0 | mg/L | SM 4500 P E |

# METHOD SUMMARY

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

| Description | Lab Location | Method | Preparation Method |
|---|---|---|---|
| **Matrix Solid** | | | |
| Organochlorine Pesticides (GC) | TAL TAM | SW846 8081A | |
| Ultrasonic Extraction | TAL TAM | | SW846 3550B |
| Organophosphorous Pesticides (GC) | TAL TAL | SW846 8141A | |
| Ultrasonic Extraction | TAL TAL | | SW846 3550B |
| Herbicides (GC) | TAL TAM | SW846 8151A | |
| Extraction (Herbicides) | TAL TAM | | SW846 8151A |
| Metals (ICP) | TAL TAM | SW846 6010B | |
| Preparation, Metals | TAL TAM | | SW846 3050B |
| Mercury (CVAA) | TAL MOB | SW846 7471A | |
| Preparation, Mercury | TAL MOB | | SW846 7471A |
| Nitrogen, Ammonia | TAL SAV | MCAWW 350.1 | |
| Ammonia ( Sediments) | TAL SAV | | EPA 3-154 |
| Nitrogen, Nitrate-Nitrite | TAL TAM | MCAWW 353.2 | |
| Deionized Water Leaching Procedure | TAL TAM | | ASTM DI Leach |
| Phosphorus, Total | TAL SAV | EPA 365.4 | |
| Phosphorus, Total | TAL SAV | | MCAWW 365.2/365.3/365 |
| Sulfide, Acid Soluble and Insoluble (Titrimetric) | TAL SAV | SW846 9034 | |
| Sulfide, Distillation (Acid Soluble and Insoluble) | TAL SAV | | SW846 9030B |
| Sulfate, Turbidimetric | TAL SAV | SW846 9038 | |
| Deionized Water Leaching Procedure | TAL SAV | | ASTM DI Leach |
| pH | TAL TAM | SW846 9045C | |
| Deionized Water Leaching Procedure | TAL TAM | | ASTM DI Leach |
| Organic Carbon, Total (TOC) | TAL SAV | SW846 9060 | |
| Percent Moisture | TAL TAM | EPA Moisture | |
| Orthophosphate | TAL TAM | SM SM 4500 P E | |
| Deionized Water Leaching Procedure | TAL TAM | | ASTM DI Leach |
| **Matrix Water** | | | |
| Dissolved Gases (GC) | TAL PEN | RSK RSK-175 | |
| Organochlorine Pesticides (GC) | TAL TAM | SW846 8081A | |
| Liquid-Liquid Extraction (Separatory Funnel) | TAL TAM | | SW846 3510C |
| Organophosphorous Pesticides (GC) | TAL TAL | SW846 8141A | |
| Liquid-Liquid Extraction (Continuous) | TAL TAL | | SW846 3520C |
| Herbicides (GC) | TAL TAM | SW846 8151A | |
| Extraction (Herbicides) | TAL TAM | | SW846 8151A |
| Metals (ICP) | TAL TAM | SW846 6010B | |
| Preparation, Total Recoverable or Dissolved Metals | TAL TAM | | SW846 3005A |
| Mercury (CVAA) | TAL MOB | SW846 7470A | |
| Preparation, Mercury | TAL MOB | | SW846 7470A |
| Turbidity, Nephelometric | TAL TAM | MCAWW 180.1 | |

# METHOD SUMMARY

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

| Description | Lab Location | Method | Preparation Method |
|---|---|---|---|
| **Matrix Water** | | | |
| Nitrogen, Ammonia | TAL TAM | MCAWW 350.1 | |
| Nitrite | TAL TAM | MCAWW 353.2 | |
| Phosphorus, Total | TAL TAM | EPA 365.4 | |
| Phosphorus, Total | TAL TAM | | MCAWW 365.2/365.3/365 |
| Chlorophyll-a | TAL ORL | SM SM 10200H | |
| Alkalinity | TAL TAM | SM SM 2320B | |
| Salinity | TAL TAM | SM SM 2520B | |
| Solids, Total Suspended (TSS) | TAL TAM | SM SM 2540D | |
| Sulfate | TAL TAM | SM SM 426C | |
| Chloride, Total | TAL TAM | SM SM 4500 Cl- E | |
| Sulfide, Total | TAL TAM | SM SM 4500 S2 F | |
| BOD, 5-Day | TAL ORL | SM SM 5210B | |
| COD | TAL TAM | SM SM 5220D | |
| COD | TAL TAM | | SM SM 5220 |
| Tannin and Lignin | TAL SAV | SM SM 5550B | |

## Lab References:

TAL MOB = TestAmerica Mobile

TAL ORL = TestAmerica Orlando

TAL PEN = TestAmerica Pensacola

TAL SAV = TestAmerica Savannah

TAL TAL = TestAmerica Tallahassee

TAL TAM = TestAmerica Tampa

## Method References:

ASTM = ASTM International

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

RSK = Sample Prep And Calculations For Dissolved Gas Analysis In Water Samples Using A GC Headspace Equilibration Technique, RSKSOP-175, Rev. 0, 8/11/94, USEPA Research Lab

SM = "Standard Methods For The Examination Of Water And Wastewater",

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

# METHOD / ANALYST SUMMARY

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

| Method | Analyst | Analyst ID |
|---|---|---|
| RSK RSK-175 | Ayers, Kim | KA |
| SW846 8081A | Myers, Randy | RM |
| SW846 8141A | Thomas, Martin L | MLT |
| SW846 8151A | Myers, Randy | RM |
| SW846 6010B | Ramos, Salvador | SR |
| SW846 7470A | Mathews, Robert | RDM |
| SW846 7471A | Mathews, Robert | RDM |
| MCAWW 180.1 | Cerome, Saurel | SC |
| MCAWW 350.1 | Ross, Jon | JR |
| MCAWW 350.1 | Steward, Tiffany | TS |
| MCAWW 353.2 | Steward, Tiffany | TS |
| EPA 365.4 | Martin, Randolph | RM |
| EPA 365.4 | Ross, Jon | JR |
| SW846 9034 | Vasquez, Juana | JV |
| SW846 9038 | Ross, Jon | JR |
| SW846 9045C | Mostafavifar, Efe | EM |
| SW846 9060 | Blackshear, Kim | KB |
| EPA Moisture | Harrison, Amanda | AH |
| SM SM 10200H | ANALYST, SUBCONTRACTED | SUB |
| SM SM 2320B | Steward, Tiffany | TS |
| SM SM 2520B | Mostafavifar, Efe | EM |
| SM SM 2540D | Oonnoonny, Thomas | TO |
| SM SM 426C | Cerome, Saurel | SC |
| SM SM 4500 Cl- E | Mostafavifar, Efe | EM |
| SM SM 4500 P E | Mostafavifar, Efe | EM |
| SM SM 4500 S2 F | Mostafavifar, Efe | EM |
| SM SM 5210B | ANALYST, SUBCONTRACTED | SUB |
| SM SM 5220D | Cerome, Saurel | SC |
| SM SM 5550B | Ross, Jon | JR |

# SAMPLE SUMMARY

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

| Lab Sample ID | Client Sample ID | Client Matrix | Date/Time Sampled | Date/Time Received |
|---|---|---|---|---|
| 660-33914-1 | 4F | Water | 02/17/2010 0930 | 02/19/2010 0850 |
| 660-33914-2 | 4E | Water | 02/17/2010 1030 | 02/19/2010 0850 |
| 660-33914-3 | 4C | Water | 02/17/2010 1120 | 02/19/2010 0850 |
| 660-33914-4 | 10 | Water | 02/17/2010 1230 | 02/19/2010 0850 |
| 660-33914-5 | 7A | Water | 02/17/2010 1350 | 02/19/2010 0850 |
| 660-33914-6 | 7B | Water | 02/17/2010 1430 | 02/19/2010 0850 |
| 660-33914-7 | Surface Water Blank | Water | 02/17/2010 0900 | 02/19/2010 0850 |
| 660-33914-8 | 4F | Solid | 02/17/2010 0940 | 02/19/2010 0850 |
| 660-33914-9 | 4E | Solid | 02/17/2010 1040 | 02/19/2010 0850 |
| 660-33914-10 | 10 | Solid | 02/17/2010 1250 | 02/19/2010 0850 |
| 660-33914-11 | 7A | Solid | 02/17/2010 1400 | 02/19/2010 0850 |

**Client Sample ID:** **4F**

Lab Sample ID: 660-33914-1
Client Matrix: Water
Date Sampled: 02/17/2010 0930
Date Received: 02/19/2010 0850

### RSK-175 Dissolved Gases (GC)

Method: RSK-175
Analysis Batch: 400-104240
Instrument ID: NOEQUIP
Preparation: N/A
Lab File ID: N/A
Dilution: 1.0
Initial Weight/Volume: 1.0 mL
Date Analyzed: 02/23/2010 1957
Final Weight/Volume: 1.0 mL
Date Prepared:
Injection Volume:

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Carbon dioxide (as CO2) | 310 | V | 7.0 | 50 |

**Client Sample ID:** **4E**

Lab Sample ID: 660-33914-2

Client Matrix: Water

Date Sampled: 02/17/2010 1030

Date Received: 02/19/2010 0850

### RSK-175 Dissolved Gases (GC)

Method: RSK-175

Preparation: N/A

Dilution: 1.0

Date Analyzed: 02/23/2010 2021

Date Prepared:

Analysis Batch: 400-104240

Instrument ID: NOEQUIP

Lab File ID: N/A

Initial Weight/Volume: 1.0 mL

Final Weight/Volume: 1.0 mL

Injection Volume:

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Carbon dioxide (as CO2) | 130 | V | 7.0 | 50 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Client Sample ID:** **4C**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33914-3 | Date Sampled: | 02/17/2010 1120 |
| Client Matrix: | Water | Date Received: | 02/19/2010 0850 |

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### RSK-175 Dissolved Gases (GC)

| | | | | |
|---|---|---|---|---|
| Method: | RSK-175 | Analysis Batch: 400-104240 | Instrument ID: | NOEQUIP |
| Preparation: | N/A | | Lab File ID: | N/A |
| Dilution: | 1.0 | | Initial Weight/Volume: | 1.0 mL |
| Date Analyzed: | 02/23/2010 2034 | | Final Weight/Volume: | 1.0 mL |
| Date Prepared: | | | Injection Volume: | |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Carbon dioxide (as CO2) | 410 | V | 7.0 | 50 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Client Sample ID:** **10**

Lab Sample ID: 660-33914-4

Client Matrix: Water

Date Sampled: 02/17/2010 1230

Date Received: 02/19/2010 0850

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### RSK-175 Dissolved Gases (GC)

Method: RSK-175

Analysis Batch: 400-104240

Instrument ID: NOEQUIP

Preparation: N/A

Lab File ID: N/A

Dilution: 1.0

Initial Weight/Volume: 1.0 mL

Date Analyzed: 02/23/2010 2046

Final Weight/Volume: 1.0 mL

Date Prepared:

Injection Volume:

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Carbon dioxide (as CO2) | 42 | I V | 7.0 | 50 |

**Client Sample ID:** **7A**

Lab Sample ID: 660-33914-5

Client Matrix: Water

Date Sampled: 02/17/2010 1350

Date Received: 02/19/2010 0850

### RSK-175 Dissolved Gases (GC)

Method: RSK-175

Preparation: N/A

Dilution: 1.0

Date Analyzed: 02/23/2010 2058

Date Prepared:

Analysis Batch: 400-104240

Instrument ID: NOEQUIP

Lab File ID: N/A

Initial Weight/Volume: 1.0 mL

Final Weight/Volume: 1.0 mL

Injection Volume:

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Carbon dioxide (as CO2) | 54 | V | 7.0 | 50 |

**Client Sample ID:** **7B**

Lab Sample ID: 660-33914-6
Client Matrix: Water

Date Sampled: 02/17/2010 1430
Date Received: 02/19/2010 0850

### RSK-175 Dissolved Gases (GC)

Method: RSK-175
Preparation: N/A
Dilution: 1.0
Date Analyzed: 02/23/2010 2110
Date Prepared:

Analysis Batch: 400-104240

Instrument ID: NOEQUIP
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL
Injection Volume:

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Carbon dioxide (as CO2) | 36 | I V | 7.0 | 50 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Client Sample ID:** **Surface Water Blank**

Lab Sample ID: 660-33914-7

Client Matrix: Water

Date Sampled: 02/17/2010 0900

Date Received: 02/19/2010 0850

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## RSK-175 Dissolved Gases (GC)

Method: RSK-175

Analysis Batch: 400-104240

Instrument ID: NOEQUIP

Preparation: N/A

Lab File ID: N/A

Dilution: 1.0

Initial Weight/Volume: 1.0 mL

Date Analyzed: 02/23/2010 2135

Final Weight/Volume: 1.0 mL

Date Prepared:

Injection Volume:

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Carbon dioxide (as CO2) | 120 | V | 7.0 | 50 |

**Client Sample ID:** **4F**

Lab Sample ID: 660-33914-1
Client Matrix: Water

Date Sampled: 02/17/2010 0930
Date Received: 02/19/2010 0850

### 8081A Organochlorine Pesticides (GC)

Method: 8081A
Preparation: 3510C
Dilution: 1.0
Date Analyzed: 02/23/2010 1412
Date Prepared: 02/22/2010 0737

Analysis Batch: 660-91104
Prep Batch: 660-90902

Instrument ID: BSGJ
Initial Weight/Volume: 1055 mL
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Result Type: PRIMARY

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Endrin aldehyde | 0.0030 | U | 0.0030 | 0.0095 |

**Client Sample ID:** **4F**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33914-1 | Date Sampled: | 02/17/2010 0930 |
| Client Matrix: | Water | Date Received: | 02/19/2010 0850 |

### 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91104 | Instrument ID: | BSGJ |
| Preparation: | 3510C | Prep Batch: 660-90902 | Initial Weight/Volume: | 1055 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/23/2010 1814 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0737 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 4,4'-DDD | 0.0039 | U | 0.0039 | 0.0095 |
| 4,4'-DDE | 0.0052 | U | 0.0052 | 0.0095 |
| 4,4'-DDT | 0.0030 | U | 0.0030 | 0.0095 |
| Aldrin | 0.0017 | U | 0.0017 | 0.0095 |
| alpha-BHC | 0.0027 | U | 0.0027 | 0.0095 |
| beta-BHC | 0.0025 | U | 0.0025 | 0.0095 |
| Chlordane (technical) | 0.054 | U | 0.054 | 0.47 |
| delta-BHC | 0.0026 | U | 0.0026 | 0.0095 |
| Dieldrin | 0.0013 | U | 0.0013 | 0.0095 |
| Endosulfan I | 0.0032 | U | 0.0032 | 0.0095 |
| Endosulfan II | 0.0031 | U | 0.0031 | 0.0095 |
| Endosulfan sulfate | 0.0028 | U | 0.0028 | 0.0095 |
| Endrin | 0.0030 | U | 0.0030 | 0.0095 |
| Endrin ketone | 0.0051 | U | 0.0051 | 0.095 |
| gamma-BHC (Lindane) | 0.0025 | U | 0.0025 | 0.0095 |
| Heptachlor | 0.0029 | U | 0.0029 | 0.0095 |
| Heptachlor epoxide | 0.0030 | U | 0.0030 | 0.0095 |
| Methoxychlor | 0.0048 | U | 0.0048 | 0.0095 |
| Toxaphene | 0.68 | U | 0.68 | 2.8 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 29 | J1 | 30 - 150 |
| Tetrachloro-m-xylene | 56 | | 30 - 150 |

**Client Sample ID:** **4E**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33914-2 | Date Sampled: 02/17/2010 1030 |
| Client Matrix: | Water | Date Received: 02/19/2010 0850 |

### 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91104 | Instrument ID: | BSGJ |
| Preparation: | 3510C | Prep Batch: 660-90902 | Initial Weight/Volume: | 1030 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/23/2010 1426 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0737 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Endrin aldehyde | 0.0031 | U | 0.0031 | 0.0097 |

**Client Sample ID:** **4E**

|  |  |  |  |
|---|---|---|---|
| Lab Sample ID: | 660-33914-2 | Date Sampled: | 02/17/2010 1030 |
| Client Matrix: | Water | Date Received: | 02/19/2010 0850 |

### 8081A Organochlorine Pesticides (GC)

|  |  |  |  |  |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91104 | Instrument ID: | BSGJ |
| Preparation: | 3510C | Prep Batch: 660-90902 | Initial Weight/Volume: | 1030 mL |
| Dilution: | 1.0 |  | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/23/2010 1827 |  | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0737 |  | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 4,4'-DDD | 0.0040 | U | 0.0040 | 0.0097 |
| 4,4'-DDE | 0.0053 | U | 0.0053 | 0.0097 |
| 4,4'-DDT | 0.0031 | U | 0.0031 | 0.0097 |
| Aldrin | 0.0018 | U | 0.0018 | 0.0097 |
| alpha-BHC | 0.0027 | U | 0.0027 | 0.0097 |
| beta-BHC | 0.0026 | U | 0.0026 | 0.0097 |
| Chlordane (technical) | 0.055 | U | 0.055 | 0.49 |
| delta-BHC | 0.0027 | U | 0.0027 | 0.0097 |
| Dieldrin | 0.0014 | U | 0.0014 | 0.0097 |
| Endosulfan I | 0.0033 | U | 0.0033 | 0.0097 |
| Endosulfan II | 0.0032 | U | 0.0032 | 0.0097 |
| Endosulfan sulfate | 0.0029 | U | 0.0029 | 0.0097 |
| Endrin | 0.0030 | U | 0.0030 | 0.0097 |
| Endrin ketone | 0.0052 | U | 0.0052 | 0.097 |
| gamma-BHC (Lindane) | 0.0025 | U | 0.0025 | 0.0097 |
| Heptachlor | 0.0030 | U | 0.0030 | 0.0097 |
| Heptachlor epoxide | 0.0031 | U | 0.0031 | 0.0097 |
| Methoxychlor | 0.0049 | U | 0.0049 | 0.0097 |
| Toxaphene | 0.70 | U | 0.70 | 2.9 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 37 |  | 30 - 150 |
| Tetrachloro-m-xylene | 61 |  | 30 - 150 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Client Sample ID:** **4C**

Lab Sample ID: 660-33914-3
Client Matrix: Water

Date Sampled: 02/17/2010 1120
Date Received: 02/19/2010 0850

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### 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91104 | Instrument ID: | BSGJ |
| Preparation: | 3510C | Prep Batch: 660-90902 | Initial Weight/Volume: | 1030 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/23/2010 1439 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0737 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Endrin aldehyde | 0.0031 | U | 0.0031 | 0.0097 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Client Sample ID: 4C**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33914-3 | Date Sampled: | 02/17/2010 1120 |
| Client Matrix: | Water | Date Received: | 02/19/2010 0850 |

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### 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91104 | Instrument ID: | BSGJ |
| Preparation: | 3510C | Prep Batch: 660-90902 | Initial Weight/Volume: | 1030 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/23/2010 1841 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0737 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 4,4'-DDD | 0.0040 | U | 0.0040 | 0.0097 |
| 4,4'-DDE | 0.0053 | U | 0.0053 | 0.0097 |
| 4,4'-DDT | 0.0031 | U | 0.0031 | 0.0097 |
| Aldrin | 0.0018 | U | 0.0018 | 0.0097 |
| alpha-BHC | 0.0027 | U | 0.0027 | 0.0097 |
| beta-BHC | 0.0026 | U | 0.0026 | 0.0097 |
| Chlordane (technical) | 0.055 | U | 0.055 | 0.49 |
| delta-BHC | 0.0027 | U | 0.0027 | 0.0097 |
| Dieldrin | 0.0014 | U | 0.0014 | 0.0097 |
| Endosulfan I | 0.0033 | U | 0.0033 | 0.0097 |
| Endosulfan II | 0.0032 | U | 0.0032 | 0.0097 |
| Endosulfan sulfate | 0.0029 | U | 0.0029 | 0.0097 |
| Endrin | 0.0030 | U | 0.0030 | 0.0097 |
| Endrin ketone | 0.0052 | U | 0.0052 | 0.097 |
| gamma-BHC (Lindane) | 0.0025 | U | 0.0025 | 0.0097 |
| Heptachlor | 0.0030 | U | 0.0030 | 0.0097 |
| Heptachlor epoxide | 0.0031 | U | 0.0031 | 0.0097 |
| Methoxychlor | 0.0049 | U | 0.0049 | 0.0097 |
| Toxaphene | 0.70 | U | 0.70 | 2.9 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 31 | | 30 - 150 |
| Tetrachloro-m-xylene | 57 | | 30 - 150 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Client Sample ID:** **10**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33914-4 | Date Sampled: | 02/17/2010 1230 |
| Client Matrix: | Water | Date Received: | 02/19/2010 0850 |

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### 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91104 | Instrument ID: | BSGJ |
| Preparation: | 3510C | Prep Batch: 660-90902 | Initial Weight/Volume: | 1050 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/23/2010 1450 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0737 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 4,4'-DDD | 0.0039 | U | 0.0039 | 0.0095 |
| 4,4'-DDE | 0.0052 | U | 0.0052 | 0.0095 |
| 4,4'-DDT | 0.0030 | U | 0.0030 | 0.0095 |
| Aldrin | 0.0017 | U | 0.0017 | 0.0095 |
| alpha-BHC | 0.0027 | U | 0.0027 | 0.0095 |
| beta-BHC | 0.0025 | U | 0.0025 | 0.0095 |
| Chlordane (technical) | 0.054 | U | 0.054 | 0.48 |
| delta-BHC | 0.0026 | U | 0.0026 | 0.0095 |
| Dieldrin | 0.0013 | U | 0.0013 | 0.0095 |
| Endosulfan I | 0.0033 | U | 0.0033 | 0.0095 |
| Endosulfan II | 0.0031 | U | 0.0031 | 0.0095 |
| Endosulfan sulfate | 0.0028 | U | 0.0028 | 0.0095 |
| Endrin | 0.0030 | U | 0.0030 | 0.0095 |
| Endrin aldehyde | 0.0030 | U | 0.0030 | 0.0095 |
| Endrin ketone | 0.0051 | U | 0.0051 | 0.095 |
| gamma-BHC (Lindane) | 0.0025 | U | 0.0025 | 0.0095 |
| Heptachlor | 0.0029 | U | 0.0029 | 0.0095 |
| Heptachlor epoxide | 0.0030 | U | 0.0030 | 0.0095 |
| Methoxychlor | 0.0048 | U | 0.0048 | 0.0095 |
| Toxaphene | 0.69 | U | 0.69 | 2.9 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 41 | | 30 - 150 |
| Tetrachloro-m-xylene | 60 | | 30 - 150 |

**Client Sample ID:** **7A**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33914-5 | Date Sampled: | 02/17/2010 1350 |
| Client Matrix: | Water | Date Received: | 02/19/2010 0850 |

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### 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91104 | Instrument ID: | BSGJ |
| Preparation: | 3510C | Prep Batch: 660-90902 | Initial Weight/Volume: | 920 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/23/2010 1505 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0737 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 4,4'-DDD | 0.0044 | U | 0.0044 | 0.011 |
| 4,4'-DDE | 0.0060 | U | 0.0060 | 0.011 |
| 4,4'-DDT | 0.0034 | U | 0.0034 | 0.011 |
| Aldrin | 0.0020 | U | 0.0020 | 0.011 |
| alpha-BHC | 0.0030 | U | 0.0030 | 0.011 |
| beta-BHC | 0.0029 | U | 0.0029 | 0.011 |
| Chlordane (technical) | 0.062 | U | 0.062 | 0.54 |
| delta-BHC | 0.0030 | U | 0.0030 | 0.011 |
| Dieldrin | 0.0015 | U | 0.0015 | 0.011 |
| Endosulfan I | 0.0037 | U | 0.0037 | 0.011 |
| Endosulfan II | 0.0036 | U | 0.0036 | 0.011 |
| Endosulfan sulfate | 0.0032 | U | 0.0032 | 0.011 |
| Endrin | 0.0034 | U | 0.0034 | 0.011 |
| Endrin aldehyde | 0.0035 | U | 0.0035 | 0.011 |
| Endrin ketone | 0.0059 | U | 0.0059 | 0.11 |
| gamma-BHC (Lindane) | 0.0028 | U | 0.0028 | 0.011 |
| Heptachlor | 0.0033 | U | 0.0033 | 0.011 |
| Heptachlor epoxide | 0.0034 | U | 0.0034 | 0.011 |
| Methoxychlor | 0.0055 | U | 0.0055 | 0.011 |
| Toxaphene | 0.78 | U | 0.78 | 3.3 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 47 | | 30 - 150 |
| Tetrachloro-m-xylene | 64 | | 30 - 150 |

## Analytical Data

Client: Environmental Engineering Consultant  Job Number: 660-33914-1

**Client Sample ID:** **7B**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33914-6 | Date Sampled: 02/17/2010 1430 |
| Client Matrix: | Water | Date Received: 02/19/2010 0850 |

### 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91104 | Instrument ID: | BSGJ |
| Preparation: | 3510C | Prep Batch: 660-90902 | Initial Weight/Volume: | 1040 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/23/2010 1519 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0737 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 4,4'-DDD | 0.0039 | U | 0.0039 | 0.0096 |
| 4,4'-DDE | 0.0053 | U | 0.0053 | 0.0096 |
| 4,4'-DDT | 0.0030 | U | 0.0030 | 0.0096 |
| Aldrin | 0.0018 | U | 0.0018 | 0.0096 |
| alpha-BHC | 0.0027 | U | 0.0027 | 0.0096 |
| beta-BHC | 0.0026 | U | 0.0026 | 0.0096 |
| Chlordane (technical) | 0.055 | U | 0.055 | 0.48 |
| delta-BHC | 0.0027 | U | 0.0027 | 0.0096 |
| Dieldrin | 0.0013 | U | 0.0013 | 0.0096 |
| Endosulfan I | 0.0033 | U | 0.0033 | 0.0096 |
| Endosulfan II | 0.0032 | U | 0.0032 | 0.0096 |
| Endosulfan sulfate | 0.0028 | U | 0.0028 | 0.0096 |
| Endrin | 0.0030 | U | 0.0030 | 0.0096 |
| Endrin aldehyde | 0.0031 | U | 0.0031 | 0.0096 |
| Endrin ketone | 0.0052 | U | 0.0052 | 0.096 |
| gamma-BHC (Lindane) | 0.0025 | U | 0.0025 | 0.0096 |
| Heptachlor | 0.0030 | U | 0.0030 | 0.0096 |
| Heptachlor epoxide | 0.0030 | U | 0.0030 | 0.0096 |
| Methoxychlor | 0.0049 | U | 0.0049 | 0.0096 |
| Toxaphene | 0.69 | U | 0.69 | 2.9 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 50 | | 30 - 150 |
| Tetrachloro-m-xylene | 63 | | 30 - 150 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Client Sample ID:** **Surface Water Blank**

Lab Sample ID: 660-33914-7
Client Matrix: Water

Date Sampled: 02/17/2010 0900
Date Received: 02/19/2010 0850

## 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91104 | Instrument ID: | BSGJ |
| Preparation: | 3510C | Prep Batch: 660-90902 | Initial Weight/Volume: | 960 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/23/2010 1533 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0737 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 4,4'-DDD | 0.0043 | U | 0.0043 | 0.010 |
| 4,4'-DDE | 0.0057 | U | 0.0057 | 0.010 |
| 4,4'-DDT | 0.0033 | U | 0.0033 | 0.010 |
| Aldrin | 0.0019 | U | 0.0019 | 0.010 |
| alpha-BHC | 0.0029 | U | 0.0029 | 0.010 |
| beta-BHC | 0.0028 | U | 0.0028 | 0.010 |
| Chlordane (technical) | 0.059 | U | 0.059 | 0.52 |
| delta-BHC | 0.0029 | U | 0.0029 | 0.010 |
| Dieldrin | 0.0015 | U | 0.0015 | 0.010 |
| Endosulfan I | 0.0036 | U | 0.0036 | 0.010 |
| Endosulfan II | 0.0034 | U | 0.0034 | 0.010 |
| Endosulfan sulfate | 0.0031 | U | 0.0031 | 0.010 |
| Endrin | 0.0032 | U | 0.0032 | 0.010 |
| Endrin aldehyde | 0.0033 | U | 0.0033 | 0.010 |
| Endrin ketone | 0.0056 | U | 0.0056 | 0.10 |
| gamma-BHC (Lindane) | 0.0027 | U | 0.0027 | 0.010 |
| Heptachlor | 0.0032 | U | 0.0032 | 0.010 |
| Heptachlor epoxide | 0.0033 | U | 0.0033 | 0.010 |
| Methoxychlor | 0.0053 | U | 0.0053 | 0.010 |
| Toxaphene | 0.75 | U | 0.75 | 3.1 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 52 | | 30 - 150 |
| Tetrachloro-m-xylene | 67 | | 30 - 150 |

# Analytical Data

Client: Environmental Engineering Consultant　　Job Number: 660-33914-1

**Client Sample ID:** **4F**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33914-8 | Date Sampled: 02/17/2010 0940 |
| Client Matrix: | Solid | Date Received: 02/19/2010 0850 |

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## 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91299 | Instrument ID: | BSGJ |
| Preparation: | 3550B | Prep Batch: 660-90901 | Initial Weight/Volume: | 30.38 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/25/2010 0523 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0654 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| 4,4'-DDD | | 0.49 | U | 0.49 | 3.3 |
| 4,4'-DDE | | 0.49 | U | 0.49 | 3.3 |
| 4,4'-DDT | | 0.49 | U | 0.49 | 3.3 |
| Aldrin | | 0.49 | U | 0.49 | 2.0 |
| alpha-BHC | | 0.14 | U | 0.14 | 1.7 |
| beta-BHC | | 0.49 | U | 0.49 | 2.0 |
| delta-BHC | | 0.49 | U | 0.49 | 2.0 |
| Dieldrin | | 1.4 | I | 0.15 | 1.7 |
| Endosulfan I | | 0.25 | U | 0.25 | 2.0 |
| Endosulfan II | | 0.25 | U | 0.25 | 3.3 |
| Endosulfan sulfate | | 0.25 | U | 0.25 | 3.3 |
| Endrin | | 0.49 | U | 0.49 | 3.9 |
| Endrin ketone | | 0.49 | U | 0.49 | 3.9 |
| gamma-BHC (Lindane) | | 0.49 | U | 0.49 | 2.0 |
| Heptachlor | | 0.49 | U | 0.49 | 2.0 |
| Heptachlor epoxide | | 0.17 | I | 0.14 | 2.0 |
| Methoxychlor | | 0.99 | U | 0.99 | 17 |
| Toxaphene | | 29 | U | 29 | 170 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 94 | | 30 - 150 |
| Tetrachloro-m-xylene | 64 | | 30 - 150 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Client Sample ID:** **4F**

Lab Sample ID: 660-33914-8

Client Matrix: Solid

Date Sampled: 02/17/2010 0940

Date Received: 02/19/2010 0850

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### 8081A Organochlorine Pesticides (GC)

|  |  |  |  |  |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91299 | Instrument ID: | BSGJ |
| Preparation: | 3550B | Prep Batch: 660-90901 | Initial Weight/Volume: | 30.38 g |
| Dilution: | 1.0 |  | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/25/2010 0536 |  | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0654 |  | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Endrin aldehyde |  | 0.49 | U | 0.49 | 3.9 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Client Sample ID:** **4F**

Lab Sample ID: 660-33914-8
Client Matrix: Solid

Date Sampled: 02/17/2010 0940
Date Received: 02/19/2010 0850

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### 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91299 | Instrument ID: | BSGJ |
| Preparation: | 3550B | Prep Batch: 660-90901 | Initial Weight/Volume: | 30.38 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/25/2010 2256 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0654 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Chlordane (technical) | | 85 | | 2.4 | 17 |

**Client Sample ID: 4E**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33914-9 | Date Sampled: | 02/17/2010 1040 |
| Client Matrix: | Solid | Date Received: | 02/19/2010 0850 |

### 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91299 | Instrument ID: | BSGJ |
| Preparation: | 3550B | Prep Batch: 660-90901 | Initial Weight/Volume: | 30.42 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/25/2010 0550 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0654 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| 4,4'-DDD | | 0.49 | U | 0.49 | 3.3 |
| 4,4'-DDE | | 0.51 | I | 0.49 | 3.3 |
| 4,4'-DDT | | 0.49 | U | 0.49 | 3.3 |
| Aldrin | | 0.49 | U | 0.49 | 2.0 |
| alpha-BHC | | 0.14 | U | 0.14 | 1.7 |
| beta-BHC | | 0.49 | U | 0.49 | 2.0 |
| Chlordane (technical) | | 2.4 | U | 2.4 | 17 |
| delta-BHC | | 0.49 | U | 0.49 | 2.0 |
| Dieldrin | | 0.42 | I | 0.15 | 1.7 |
| Endosulfan I | | 0.25 | U | 0.25 | 2.0 |
| Endosulfan II | | 0.25 | U | 0.25 | 3.3 |
| Endosulfan sulfate | | 0.25 | U | 0.25 | 3.3 |
| Endrin | | 0.49 | U | 0.49 | 3.9 |
| Endrin ketone | | 0.49 | U | 0.49 | 3.9 |
| gamma-BHC (Lindane) | | 0.49 | U | 0.49 | 2.0 |
| Heptachlor | | 0.49 | U | 0.49 | 2.0 |
| Heptachlor epoxide | | 0.14 | U | 0.14 | 2.0 |
| Methoxychlor | | 0.99 | U | 0.99 | 17 |
| Toxaphene | | 29 | U | 29 | 170 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 48 | | 30 - 150 |
| Tetrachloro-m-xylene | 68 | | 30 - 150 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Client Sample ID:** **4E**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33914-9 | Date Sampled: | 02/17/2010 1040 |
| Client Matrix: | Solid | Date Received: | 02/19/2010 0850 |

## 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91299 | Instrument ID: | BSGJ |
| Preparation: | 3550B | Prep Batch: 660-90901 | Initial Weight/Volume: | 30.42 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/25/2010 0603 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0654 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Endrin aldehyde | | 0.49 | U | 0.49 | 3.9 |

**Client Sample ID:** **10**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33914-10 | Date Sampled: | 02/17/2010 1250 |
| Client Matrix: | Solid | Date Received: | 02/19/2010 0850 |

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### 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91299 | Instrument ID: | BSGJ |
| Preparation: | 3550B | Prep Batch: 660-90901 | Initial Weight/Volume: | 29.83 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/25/2010 0617 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0654 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| 4,4'-DDD | | 0.50 | U | 0.50 | 3.3 |
| 4,4'-DDE | | 0.50 | U | 0.50 | 3.3 |
| 4,4'-DDT | | 0.50 | U | 0.50 | 3.3 |
| Aldrin | | 0.50 | U | 0.50 | 2.0 |
| alpha-BHC | | 0.14 | U | 0.14 | 1.7 |
| beta-BHC | | 0.50 | U | 0.50 | 2.0 |
| Chlordane (technical) | | 2.4 | U | 2.4 | 17 |
| delta-BHC | | 0.50 | U | 0.50 | 2.0 |
| Dieldrin | | 0.15 | U | 0.15 | 1.7 |
| Endosulfan I | | 0.25 | U | 0.25 | 2.0 |
| Endosulfan II | | 0.25 | U | 0.25 | 3.3 |
| Endosulfan sulfate | | 0.25 | U | 0.25 | 3.3 |
| Endrin | | 0.50 | U | 0.50 | 4.0 |
| Endrin ketone | | 0.50 | U | 0.50 | 4.0 |
| gamma-BHC (Lindane) | | 0.50 | U | 0.50 | 2.0 |
| Heptachlor | | 0.50 | U | 0.50 | 2.0 |
| Heptachlor epoxide | | 0.14 | U | 0.14 | 2.0 |
| Methoxychlor | | 1.0 | U | 1.0 | 17 |
| Toxaphene | | 29 | U | 29 | 170 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 44 | | 30 - 150 |
| Tetrachloro-m-xylene | 64 | | 30 - 150 |

**Client Sample ID:** **10**

Lab Sample ID: 660-33914-10
Client Matrix: Solid

Date Sampled: 02/17/2010 1250
Date Received: 02/19/2010 0850

### 8081A Organochlorine Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8081A | Analysis Batch: 660-91299 | Instrument ID: | BSGJ |
| Preparation: | 3550B | Prep Batch: 660-90901 | Initial Weight/Volume: | 29.83 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 02/25/2010 0630 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/22/2010 0654 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Endrin aldehyde | | 0.50 | U | 0.50 | 4.0 |

**Client Sample ID:** **7A**

Lab Sample ID: 660-33914-11
Client Matrix: Solid

Date Sampled: 02/17/2010 1400
Date Received: 02/19/2010 0850

### 8081A Organochlorine Pesticides (GC)

Method: 8081A
Preparation: 3550B
Dilution: 1.0
Date Analyzed: 02/25/2010 0643
Date Prepared: 02/22/2010 0654

Analysis Batch: 660-91299
Prep Batch: 660-90901

Instrument ID: BSGJ
Initial Weight/Volume: 30.20 g
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Result Type: PRIMARY

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| 4,4'-DDD | | 0.50 | U | 0.50 | 3.3 |
| 4,4'-DDE | | 0.50 | U | 0.50 | 3.3 |
| 4,4'-DDT | | 0.50 | U J3 | 0.50 | 3.3 |
| Aldrin | | 0.50 | U | 0.50 | 2.0 |
| alpha-BHC | | 0.14 | U | 0.14 | 1.7 |
| beta-BHC | | 0.50 | U | 0.50 | 2.0 |
| Chlordane (technical) | | 2.4 | U | 2.4 | 17 |
| delta-BHC | | 0.50 | U | 0.50 | 2.0 |
| Dieldrin | | 0.15 | U | 0.15 | 1.7 |
| Endosulfan I | | 0.25 | U | 0.25 | 2.0 |
| Endosulfan II | | 0.25 | U J3 | 0.25 | 3.3 |
| Endosulfan sulfate | | 0.25 | U | 0.25 | 3.3 |
| Endrin | | 0.50 | U J3 | 0.50 | 4.0 |
| Endrin aldehyde | | 0.50 | U | 0.50 | 4.0 |
| Endrin ketone | | 0.50 | U J3 | 0.50 | 4.0 |
| gamma-BHC (Lindane) | | 0.50 | U J3 | 0.50 | 2.0 |
| Heptachlor | | 0.50 | U J3 | 0.50 | 2.0 |
| Heptachlor epoxide | | 0.14 | U J3 | 0.14 | 2.0 |
| Methoxychlor | | 0.99 | U J3 | 0.99 | 17 |
| Toxaphene | | 29 | U | 29 | 170 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 48 | | 30 - 150 |
| Tetrachloro-m-xylene | 72 | | 30 - 150 |

## Analytical Data

Client: Environmental Engineering Consultant
Job Number: 660-33914-1

**Client Sample ID:** **4F**

Lab Sample ID: 660-33914-1
Client Matrix: Water
Date Sampled: 02/17/2010 0930
Date Received: 02/19/2010 0850

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### 8141A Organophosphorous Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-65998 | Instrument ID: | SGF |
| Preparation: | 3520C | Prep Batch: 640-65857 | Initial Weight/Volume: | 1060 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 5.0 mL |
| Date Analyzed: | 02/25/2010 1526 | | Injection Volume: | 1 uL |
| Date Prepared: | 02/22/2010 1420 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Hexazinone | 0.15 | U | 0.15 | 1.9 |

**Client Sample ID: 4F**

Lab Sample ID: 660-33914-1
Client Matrix: Water

Date Sampled: 02/17/2010 0930
Date Received: 02/19/2010 0850

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### 8141A Organophosphorous Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-66015 | Instrument ID: | SGF |
| Preparation: | 3520C | Prep Batch: 640-65857 | Initial Weight/Volume: | 1060 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 5.0 mL |
| Date Analyzed: | 02/26/2010 1325 | | Injection Volume: | 1 uL |
| Date Prepared: | 02/22/2010 1420 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Azinphos-methyl | 0.31 | U | 0.31 | 0.94 |
| Bolstar | 0.090 | U | 0.090 | 0.94 |
| Chlorpyrifos | 0.10 | U | 0.10 | 0.94 |
| Coumaphos | 0.076 | U | 0.076 | 0.94 |
| Demeton, Total | 0.14 | U | 0.14 | 2.4 |
| Diazinon | 0.10 | U | 0.10 | 0.94 |
| Dichlorvos | 0.25 | U | 0.25 | 1.9 |
| Dimethoate | 0.30 | U | 0.30 | 1.9 |
| Disulfoton | 0.11 | U | 0.11 | 1.9 |
| EPN | 0.067 | U | 0.067 | 0.94 |
| Ethoprop | 0.39 | U | 0.39 | 0.47 |
| Fensulfothion | 0.16 | U | 0.16 | 4.7 |
| Malathion | 0.25 | I | 0.087 | 0.94 |
| Merphos | 0.12 | U | 0.12 | 0.94 |
| Mevinphos | 0.14 | U | 0.14 | 1.9 |
| Monochrotophos | 2.5 | U J3 | 2.5 | 9.4 |
| Naled | 0.34 | U | 0.34 | 4.7 |
| Ethyl Parathion | 0.075 | U | 0.075 | 0.94 |
| Methyl parathion | 0.11 | U | 0.11 | 0.47 |
| Phorate | 0.15 | U | 0.15 | 0.94 |
| Ronnel | 0.12 | U | 0.12 | 0.94 |
| Sulfotepp | 0.052 | U | 0.052 | 0.47 |
| Stirophos | 0.079 | U | 0.079 | 0.94 |
| Tokuthion | 0.082 | U | 0.082 | 0.94 |
| Trichloronate | 0.10 | U | 0.10 | 0.94 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 28 | J1 | 37 - 139 |

**Client Sample ID:** **4E**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33914-2 | Date Sampled: 02/17/2010 1030 |
| Client Matrix: | Water | Date Received: 02/19/2010 0850 |

### 8141A Organophosphorous Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-65998 | Instrument ID: | SGF |
| Preparation: | 3520C | Prep Batch: 640-65857 | Initial Weight/Volume: | 1020 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 5.0 mL |
| Date Analyzed: | 02/25/2010 1540 | | Injection Volume: | 1 uL |
| Date Prepared: | 02/22/2010 1420 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Hexazinone | 0.16 | U | 0.16 | 2.0 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Client Sample ID: 4E**

Lab Sample ID: 660-33914-2
Client Matrix: Water

Date Sampled: 02/17/2010 1030
Date Received: 02/19/2010 0850

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## 8141A Organophosphorous Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-66015 | Instrument ID: | SGF |
| Preparation: | 3520C | Prep Batch: 640-65857 | Initial Weight/Volume: | 1020 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 5.0 mL |
| Date Analyzed: | 02/26/2010 1310 | | Injection Volume: | 1 uL |
| Date Prepared: | 02/22/2010 1420 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Azinphos-methyl | 0.32 | U | 0.32 | 0.98 |
| Bolstar | 0.093 | U | 0.093 | 0.98 |
| Chlorpyrifos | 0.11 | U | 0.11 | 0.98 |
| Coumaphos | 0.079 | U | 0.079 | 0.98 |
| Demeton, Total | 0.15 | U | 0.15 | 2.5 |
| Diazinon | 0.11 | U | 0.11 | 0.98 |
| Dichlorvos | 0.25 | U | 0.25 | 2.0 |
| Dimethoate | 0.31 | U | 0.31 | 2.0 |
| Disulfoton | 0.12 | U | 0.12 | 2.0 |
| EPN | 0.070 | U | 0.070 | 0.98 |
| Ethoprop | 0.40 | U | 0.40 | 0.49 |
| Fensulfothion | 0.17 | U | 0.17 | 4.9 |
| Malathion | 0.090 | U | 0.090 | 0.98 |
| Merphos | 0.13 | U | 0.13 | 0.98 |
| Mevinphos | 0.15 | U | 0.15 | 2.0 |
| Monochrotophos | 2.5 | U J3 | 2.5 | 9.8 |
| Naled | 0.35 | U | 0.35 | 4.9 |
| Ethyl Parathion | 0.078 | U | 0.078 | 0.98 |
| Methyl parathion | 0.12 | U | 0.12 | 0.49 |
| Phorate | 0.16 | U | 0.16 | 0.98 |
| Ronnel | 0.13 | U | 0.13 | 0.98 |
| Sulfotepp | 0.054 | U | 0.054 | 0.49 |
| Stirophos | 0.082 | U | 0.082 | 0.98 |
| Tokuthion | 0.085 | U | 0.085 | 0.98 |
| Trichloronate | 0.11 | U | 0.11 | 0.98 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 94 | | 37 - 139 |

**Client Sample ID: 4C**

|  |  |  |
|---|---|---|
| Lab Sample ID: | 660-33914-3 | Date Sampled: 02/17/2010 1120 |
| Client Matrix: | Water | Date Received: 02/19/2010 0850 |

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### 8141A Organophosphorous Pesticides (GC)

|  |  |  |  |  |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-65998 | Instrument ID: | SGF |
| Preparation: | 3520C | Prep Batch: 640-65857 | Initial Weight/Volume: | 1020 mL |
| Dilution: | 1.0 |  | Final Weight/Volume: | 5.0 mL |
| Date Analyzed: | 02/25/2010 1554 |  | Injection Volume: | 1 uL |
| Date Prepared: | 02/22/2010 1420 |  | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Hexazinone | 0.16 | U | 0.16 | 2.0 |

**Client Sample ID:** **4C**

Lab Sample ID: 660-33914-3
Client Matrix: Water

Date Sampled: 02/17/2010 1120
Date Received: 02/19/2010 0850

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### 8141A Organophosphorous Pesticides (GC)

Method: 8141A
Preparation: 3520C
Dilution: 1.0
Date Analyzed: 02/26/2010 1256
Date Prepared: 02/22/2010 1420

Analysis Batch: 640-66015
Prep Batch: 640-65857

Instrument ID: SGF
Initial Weight/Volume: 1020 mL
Final Weight/Volume: 5.0 mL
Injection Volume: 1 uL
Result Type: PRIMARY

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Azinphos-methyl | 0.32 | U | 0.32 | 0.98 |
| Bolstar | 0.093 | U | 0.093 | 0.98 |
| Chlorpyrifos | 0.11 | U | 0.11 | 0.98 |
| Coumaphos | 0.079 | U | 0.079 | 0.98 |
| Demeton, Total | 0.15 | U | 0.15 | 2.5 |
| Diazinon | 0.11 | U | 0.11 | 0.98 |
| Dichlorvos | 0.25 | U | 0.25 | 2.0 |
| Dimethoate | 0.31 | U | 0.31 | 2.0 |
| Disulfoton | 0.12 | U | 0.12 | 2.0 |
| EPN | 0.070 | U | 0.070 | 0.98 |
| Ethoprop | 0.40 | U | 0.40 | 0.49 |
| Fensulfothion | 0.17 | U | 0.17 | 4.9 |
| Malathion | 0.090 | U | 0.090 | 0.98 |
| Merphos | 0.13 | U | 0.13 | 0.98 |
| Mevinphos | 0.15 | U | 0.15 | 2.0 |
| Monochrotophos | 2.5 | U J3 | 2.5 | 9.8 |
| Naled | 0.35 | U | 0.35 | 4.9 |
| Ethyl Parathion | 0.078 | U | 0.078 | 0.98 |
| Methyl parathion | 0.12 | U | 0.12 | 0.49 |
| Phorate | 0.16 | U | 0.16 | 0.98 |
| Ronnel | 0.13 | U | 0.13 | 0.98 |
| Sulfotepp | 0.054 | U | 0.054 | 0.49 |
| Stirophos | 0.082 | U | 0.082 | 0.98 |
| Tokuthion | 0.085 | U | 0.085 | 0.98 |
| Trichloronate | 0.11 | U | 0.11 | 0.98 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 83 | | 37 - 139 |

**Client Sample ID:** **10**

Lab Sample ID: 660-33914-4

Client Matrix: Water

Date Sampled: 02/17/2010 1230

Date Received: 02/19/2010 0850

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### 8141A Organophosphorous Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-65998 | Instrument ID: | SGF |
| Preparation: | 3520C | Prep Batch: 640-65857 | Initial Weight/Volume: | 1040 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 5.0 mL |
| Date Analyzed: | 02/25/2010 1623 | | Injection Volume: | 1 uL |
| Date Prepared: | 02/22/2010 1420 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Hexazinone | 0.15 | U | 0.15 | 1.9 |

**Client Sample ID: 10**

Lab Sample ID: 660-33914-4
Client Matrix: Water

Date Sampled: 02/17/2010 1230
Date Received: 02/19/2010 0850

### 8141A Organophosphorous Pesticides (GC)

Method: 8141A
Preparation: 3520C
Dilution: 1.0
Date Analyzed: 02/26/2010 1242
Date Prepared: 02/22/2010 1420

Analysis Batch: 640-66015
Prep Batch: 640-65857

Instrument ID: SGF
Initial Weight/Volume: 1040 mL
Final Weight/Volume: 5.0 mL
Injection Volume: 1 uL
Result Type: PRIMARY

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Azinphos-methyl | 0.32 | U | 0.32 | 0.96 |
| Bolstar | 0.091 | U | 0.091 | 0.96 |
| Chlorpyrifos | 0.11 | U | 0.11 | 0.96 |
| Coumaphos | 0.078 | U | 0.078 | 0.96 |
| Demeton, Total | 0.14 | U | 0.14 | 2.4 |
| Diazinon | 0.11 | U | 0.11 | 0.96 |
| Dichlorvos | 0.25 | U | 0.25 | 1.9 |
| Dimethoate | 0.31 | U | 0.31 | 1.9 |
| Disulfoton | 0.12 | U | 0.12 | 1.9 |
| EPN | 0.068 | U | 0.068 | 0.96 |
| Ethoprop | 0.39 | U | 0.39 | 0.48 |
| Fensulfothion | 0.16 | U | 0.16 | 4.8 |
| Malathion | 0.088 | U | 0.088 | 0.96 |
| Merphos | 0.12 | U | 0.12 | 0.96 |
| Mevinphos | 0.14 | U | 0.14 | 1.9 |
| Monochrotophos | 2.5 | U J3 | 2.5 | 9.6 |
| Naled | 0.35 | U | 0.35 | 4.8 |
| Ethyl Parathion | 0.077 | U | 0.077 | 0.96 |
| Methyl parathion | 0.12 | U | 0.12 | 0.48 |
| Phorate | 0.15 | U | 0.15 | 0.96 |
| Ronnel | 0.12 | U | 0.12 | 0.96 |
| Sulfotepp | 0.053 | U | 0.053 | 0.48 |
| Stirophos | 0.081 | U | 0.081 | 0.96 |
| Tokuthion | 0.084 | U | 0.084 | 0.96 |
| Trichloronate | 0.11 | U | 0.11 | 0.96 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 92 | | 37 - 139 |

**Client Sample ID:** **7A**

|  |  |  |
|---|---|---|
| Lab Sample ID: | 660-33914-5 | Date Sampled: 02/17/2010 1350 |
| Client Matrix: | Water | Date Received: 02/19/2010 0850 |

### 8141A Organophosphorous Pesticides (GC)

|  |  |  |  |  |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-65998 | Instrument ID: | SGF |
| Preparation: | 3520C | Prep Batch: 640-65857 | Initial Weight/Volume: | 1060 mL |
| Dilution: | 1.0 |  | Final Weight/Volume: | 5.0 mL |
| Date Analyzed: | 02/25/2010 1637 |  | Injection Volume: | 1 uL |
| Date Prepared: | 02/22/2010 1420 |  | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Hexazinone | 0.15 | U | 0.15 | 1.9 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Client Sample ID:** **7A**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33914-5 | Date Sampled: | 02/17/2010 1350 |
| Client Matrix: | Water | Date Received: | 02/19/2010 0850 |

## 8141A Organophosphorous Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-66015 | Instrument ID: | SGF |
| Preparation: | 3520C | Prep Batch: 640-65857 | Initial Weight/Volume: | 1060 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 5.0 mL |
| Date Analyzed: | 02/26/2010 1646 | | Injection Volume: | 1 uL |
| Date Prepared: | 02/22/2010 1420 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Azinphos-methyl | 0.31 | U | 0.31 | 0.94 |
| Bolstar | 0.090 | U | 0.090 | 0.94 |
| Chlorpyrifos | 0.10 | U | 0.10 | 0.94 |
| Coumaphos | 0.076 | U | 0.076 | 0.94 |
| Demeton, Total | 0.14 | U | 0.14 | 2.4 |
| Diazinon | 0.10 | U | 0.10 | 0.94 |
| Dichlorvos | 0.25 | U | 0.25 | 1.9 |
| Dimethoate | 0.30 | U | 0.30 | 1.9 |
| Disulfoton | 0.11 | U | 0.11 | 1.9 |
| EPN | 0.067 | U | 0.067 | 0.94 |
| Ethoprop | 0.39 | U | 0.39 | 0.47 |
| Fensulfothion | 0.16 | U | 0.16 | 4.7 |
| Malathion | 0.087 | U | 0.087 | 0.94 |
| Merphos | 0.12 | U | 0.12 | 0.94 |
| Mevinphos | 0.14 | U | 0.14 | 1.9 |
| Monochrotophos | 2.5 | U J3 | 2.5 | 9.4 |
| Naled | 0.34 | U | 0.34 | 4.7 |
| Ethyl Parathion | 0.075 | U | 0.075 | 0.94 |
| Methyl parathion | 0.11 | U | 0.11 | 0.47 |
| Phorate | 0.15 | U | 0.15 | 0.94 |
| Ronnel | 0.12 | U | 0.12 | 0.94 |
| Sulfotepp | 0.052 | U | 0.052 | 0.47 |
| Stirophos | 0.079 | U | 0.079 | 0.94 |
| Tokuthion | 0.082 | U | 0.082 | 0.94 |
| Trichloronate | 0.10 | U | 0.10 | 0.94 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 92 | | 37 - 139 |

**Client Sample ID:** **7B**

Lab Sample ID: 660-33914-6
Client Matrix: Water

Date Sampled: 02/17/2010 1430
Date Received: 02/19/2010 0850

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### 8141A Organophosphorous Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-65998 | Instrument ID: | SGF |
| Preparation: | 3520C | Prep Batch: 640-65857 | Initial Weight/Volume: | 1000 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 5.0 mL |
| Date Analyzed: | 02/25/2010 1705 | | Injection Volume: | 1 uL |
| Date Prepared: | 02/22/2010 1420 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Hexazinone | 0.16 | U | 0.16 | 2.0 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Client Sample ID:** **7B**

Lab Sample ID: 660-33914-6
Client Matrix: Water

Date Sampled: 02/17/2010 1430
Date Received: 02/19/2010 0850

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## 8141A Organophosphorous Pesticides (GC)

Method: 8141A
Preparation: 3520C
Dilution: 1.0
Date Analyzed: 02/26/2010 1936
Date Prepared: 02/22/2010 1420

Analysis Batch: 640-66015
Prep Batch: 640-65857

Instrument ID: SGF
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 5.0 mL
Injection Volume: 1 uL
Result Type: PRIMARY

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Azinphos-methyl | 0.33 | U | 0.33 | 1.0 |
| Bolstar | 0.095 | U | 0.095 | 1.0 |
| Chlorpyrifos | 0.11 | U | 0.11 | 1.0 |
| Coumaphos | 0.081 | U | 0.081 | 1.0 |
| Demeton, Total | 0.15 | U | 0.15 | 2.5 |
| Diazinon | 0.11 | U | 0.11 | 1.0 |
| Dichlorvos | 0.26 | U | 0.26 | 2.0 |
| Dimethoate | 0.32 | U | 0.32 | 2.0 |
| Disulfoton | 0.12 | U | 0.12 | 2.0 |
| EPN | 0.071 | U | 0.071 | 1.0 |
| Ethoprop | 0.41 | U | 0.41 | 0.50 |
| Fensulfothion | 0.17 | U | 0.17 | 5.0 |
| Malathion | 0.092 | U | 0.092 | 1.0 |
| Merphos | 0.13 | U | 0.13 | 1.0 |
| Mevinphos | 0.15 | U | 0.15 | 2.0 |
| Monochrotophos | 2.6 | U J3 | 2.6 | 10 |
| Naled | 0.36 | U | 0.36 | 5.0 |
| Ethyl Parathion | 0.080 | U | 0.080 | 1.0 |
| Methyl parathion | 0.12 | U | 0.12 | 0.50 |
| Phorate | 0.16 | U | 0.16 | 1.0 |
| Ronnel | 0.13 | U | 0.13 | 1.0 |
| Sulfotepp | 0.055 | U | 0.055 | 0.50 |
| Stirophos | 0.084 | U | 0.084 | 1.0 |
| Tokuthion | 0.087 | U | 0.087 | 1.0 |
| Trichloronate | 0.11 | U | 0.11 | 1.0 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 89 |  | 37 - 139 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Client Sample ID:** **Surface Water Blank**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33914-7 | Date Sampled: 02/17/2010 0900 |
| Client Matrix: | Water | Date Received: 02/19/2010 0850 |

## 8141A Organophosphorous Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-65998 | Instrument ID: | SGF |
| Preparation: | 3520C | Prep Batch: 640-65857 | Initial Weight/Volume: | 1000 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 5.0 mL |
| Date Analyzed: | 02/25/2010 1720 | | Injection Volume: | 1 uL |
| Date Prepared: | 02/22/2010 1420 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Hexazinone | 0.16 | U | 0.16 | 2.0 |

**Client Sample ID: Surface Water Blank**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33914-7 | Date Sampled: | 02/17/2010 0900 |
| Client Matrix: | Water | Date Received: | 02/19/2010 0850 |

### 8141A Organophosphorous Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-66015 | Instrument ID: | SGF |
| Preparation: | 3520C | Prep Batch: 640-65857 | Initial Weight/Volume: | 1000 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 5.0 mL |
| Date Analyzed: | 02/26/2010 1951 | | Injection Volume: | 1 uL |
| Date Prepared: | 02/22/2010 1420 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Azinphos-methyl | 0.33 | U | 0.33 | 1.0 |
| Bolstar | 0.095 | U | 0.095 | 1.0 |
| Chlorpyrifos | 0.11 | U | 0.11 | 1.0 |
| Coumaphos | 0.081 | U | 0.081 | 1.0 |
| Demeton, Total | 0.15 | U | 0.15 | 2.5 |
| Diazinon | 0.11 | U | 0.11 | 1.0 |
| Dichlorvos | 0.26 | U | 0.26 | 2.0 |
| Dimethoate | 0.32 | U | 0.32 | 2.0 |
| Disulfoton | 0.12 | U | 0.12 | 2.0 |
| EPN | 0.071 | U | 0.071 | 1.0 |
| Ethoprop | 0.41 | U | 0.41 | 0.50 |
| Fensulfothion | 0.17 | U | 0.17 | 5.0 |
| Malathion | 0.092 | U | 0.092 | 1.0 |
| Merphos | 0.13 | U | 0.13 | 1.0 |
| Mevinphos | 0.15 | U | 0.15 | 2.0 |
| Monochrotophos | 2.6 | U J3 | 2.6 | 10 |
| Naled | 0.36 | U | 0.36 | 5.0 |
| Ethyl Parathion | 0.080 | U | 0.080 | 1.0 |
| Methyl parathion | 0.12 | U | 0.12 | 0.50 |
| Phorate | 0.16 | U | 0.16 | 1.0 |
| Ronnel | 0.13 | U | 0.13 | 1.0 |
| Sulfotepp | 0.055 | U | 0.055 | 0.50 |
| Stirophos | 0.084 | U | 0.084 | 1.0 |
| Tokuthion | 0.087 | U | 0.087 | 1.0 |
| Trichloronate | 0.11 | U | 0.11 | 1.0 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 101 | | 37 - 139 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Client Sample ID:** **4F**

Lab Sample ID: 660-33914-8
Client Matrix: Solid

Date Sampled: 02/17/2010 0940
Date Received: 02/19/2010 0850

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## 8141A Organophosphorous Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-65935 | Instrument ID: | SGF |
| Preparation: | 3550B | Prep Batch: 640-65855 | Initial Weight/Volume: | 00030.45 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10.0 mL |
| Date Analyzed: | 02/24/2010 1406 | | Injection Volume: | 1 uL |
| Date Prepared: | 02/22/2010 1006 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Azinphos-methyl | | 4.3 | U | 4.3 | 65 |
| Bolstar | | 8.4 | U | 8.4 | 33 |
| Chlorpyrifos | | 8.3 | U | 8.3 | 33 |
| Coumaphos | | 8.5 | U | 8.5 | 330 |
| Demeton, Total | | 13 | U | 13 | 82 |
| Diazinon | | 8.7 | U | 8.7 | 33 |
| Dichlorvos | | 17 | U | 17 | 65 |
| Dimethoate | | 9.9 | U | 9.9 | 65 |
| Disulfoton | | 11 | U | 11 | 65 |
| EPN | | 9.0 | U | 9.0 | 33 |
| Ethoprop | | 15 | U | 15 | 17 |
| Ethyl Parathion | | 8.7 | U | 8.7 | 33 |
| Fensulfothion | | 9.9 | U | 9.9 | 330 |
| Hexazinone | | 7.6 | U | 7.6 | 33 |
| Malathion | | 8.9 | U | 8.9 | 33 |
| Merphos | | 8.2 | U | 8.2 | 33 |
| Methyl parathion | | 5.3 | U | 5.3 | 17 |
| Mevinphos | | 11 | U | 11 | 65 |
| Monochrotophos | | 84 | U | 84 | 330 |
| Naled | | 5.1 | U | 5.1 | 330 |
| Phorate | | 11 | U | 11 | 33 |
| Ronnel | | 7.9 | U | 7.9 | 33 |
| Stirophos | | 8.8 | U | 8.8 | 33 |
| Sulfotepp | | 5.2 | U | 5.2 | 17 |
| Tokuthion | | 7.6 | U | 7.6 | 33 |
| Trichloronate | | 8.1 | U | 8.1 | 330 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 54 | | 35 - 134 |

**Client Sample ID:** **4E**

Lab Sample ID: 660-33914-9
Client Matrix: Solid

Date Sampled: 02/17/2010 1040
Date Received: 02/19/2010 0850

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## 8141A Organophosphorous Pesticides (GC)

Method: 8141A
Preparation: 3550B
Dilution: 1.0
Date Analyzed: 02/24/2010 1421
Date Prepared: 02/22/2010 1006

Analysis Batch: 640-65935
Prep Batch: 640-65855

Instrument ID: SGF
Initial Weight/Volume: 00030.00 g
Final Weight/Volume: 10.0 mL
Injection Volume: 1 uL
Result Type: PRIMARY

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Azinphos-methyl | | 4.4 | U | 4.4 | 66 |
| Bolstar | | 8.5 | U | 8.5 | 33 |
| Chlorpyrifos | | 8.4 | U | 8.4 | 33 |
| Coumaphos | | 8.6 | U | 8.6 | 330 |
| Demeton, Total | | 13 | U | 13 | 83 |
| Diazinon | | 8.8 | U | 8.8 | 33 |
| Dichlorvos | | 17 | U | 17 | 66 |
| Dimethoate | | 10 | U | 10 | 66 |
| Disulfoton | | 11 | U | 11 | 66 |
| EPN | | 9.1 | U | 9.1 | 33 |
| Ethoprop | | 15 | U | 15 | 17 |
| Ethyl Parathion | | 8.8 | U | 8.8 | 33 |
| Fensulfothion | | 10 | U | 10 | 330 |
| Hexazinone | | 7.7 | U | 7.7 | 33 |
| Malathion | | 9.0 | U | 9.0 | 33 |
| Merphos | | 8.3 | U | 8.3 | 33 |
| Methyl parathion | | 5.4 | U | 5.4 | 17 |
| Mevinphos | | 11 | U | 11 | 66 |
| Monochrotophos | | 85 | U | 85 | 330 |
| Naled | | 5.2 | U | 5.2 | 330 |
| Phorate | | 11 | U | 11 | 33 |
| Ronnel | | 8.0 | U | 8.0 | 33 |
| Stirophos | | 8.9 | U | 8.9 | 33 |
| Sulfotepp | | 5.3 | U | 5.3 | 17 |
| Tokuthion | | 7.7 | U | 7.7 | 33 |
| Trichloronate | | 8.2 | U | 8.2 | 330 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 41 | | 35 - 134 |

**Client Sample ID:** **10**

Lab Sample ID: 660-33914-10
Client Matrix: Solid

Date Sampled: 02/17/2010 1250
Date Received: 02/19/2010 0850

### 8141A Organophosphorous Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-65935 | Instrument ID: | SGF |
| Preparation: | 3550B | Prep Batch: 640-65855 | Initial Weight/Volume: | 00030.23 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10.0 mL |
| Date Analyzed: | 02/24/2010 1449 | | Injection Volume: | 1 uL |
| Date Prepared: | 02/22/2010 1006 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Azinphos-methyl | | 4.4 | U | 4.4 | 65 |
| Bolstar | | 8.4 | U | 8.4 | 33 |
| Chlorpyrifos | | 8.3 | U | 8.3 | 33 |
| Coumaphos | | 8.5 | U | 8.5 | 330 |
| Demeton, Total | | 13 | U | 13 | 82 |
| Diazinon | | 8.7 | U | 8.7 | 33 |
| Dichlorvos | | 17 | U | 17 | 65 |
| Dimethoate | | 9.9 | U | 9.9 | 65 |
| Disulfoton | | 11 | U | 11 | 65 |
| EPN | | 9.0 | U | 9.0 | 33 |
| Ethoprop | | 15 | U | 15 | 17 |
| Ethyl Parathion | | 8.7 | U | 8.7 | 33 |
| Fensulfothion | | 9.9 | U | 9.9 | 330 |
| Hexazinone | | 7.6 | U | 7.6 | 33 |
| Malathion | | 8.9 | U | 8.9 | 33 |
| Merphos | | 8.2 | U | 8.2 | 33 |
| Methyl parathion | | 5.4 | U | 5.4 | 17 |
| Mevinphos | | 11 | U | 11 | 65 |
| Monochrotophos | | 84 | U | 84 | 330 |
| Naled | | 5.2 | U | 5.2 | 330 |
| Phorate | | 11 | U | 11 | 33 |
| Ronnel | | 7.9 | U | 7.9 | 33 |
| Stirophos | | 8.8 | U | 8.8 | 33 |
| Sulfotepp | | 5.3 | U | 5.3 | 17 |
| Tokuthion | | 7.6 | U | 7.6 | 33 |
| Trichloronate | | 8.1 | U | 8.1 | 330 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 47 | | 35 - 134 |

# Analytical Data

Client: Environmental Engineering Consultant Job Number: 660-33914-1

**Client Sample ID: 7A**

Lab Sample ID: 660-33914-11
Client Matrix: Solid

Date Sampled: 02/17/2010 1400
Date Received: 02/19/2010 0850

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## 8141A Organophosphorous Pesticides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8141A | Analysis Batch: 640-65935 | Instrument ID: | SGF |
| Preparation: | 3550B | Prep Batch: 640-65855 | Initial Weight/Volume: | 00030.25 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10.0 mL |
| Date Analyzed: | 02/24/2010 1503 | | Injection Volume: | 1 uL |
| Date Prepared: | 02/22/2010 1006 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Azinphos-methyl | | 4.4 | U | 4.4 | 65 |
| Bolstar | | 8.4 | U | 8.4 | 33 |
| Chlorpyrifos | | 8.3 | U | 8.3 | 33 |
| Coumaphos | | 8.5 | U | 8.5 | 330 |
| Demeton, Total | | 13 | U | 13 | 82 |
| Diazinon | | 8.7 | U | 8.7 | 33 |
| Dichlorvos | | 17 | U | 17 | 65 |
| Dimethoate | | 9.9 | U | 9.9 | 65 |
| Disulfoton | | 11 | U | 11 | 65 |
| EPN | | 9.0 | U | 9.0 | 33 |
| Ethoprop | | 15 | U | 15 | 17 |
| Ethyl Parathion | | 8.7 | U | 8.7 | 33 |
| Fensulfothion | | 9.9 | U | 9.9 | 330 |
| Hexazinone | | 7.6 | U | 7.6 | 33 |
| Malathion | | 8.9 | U | 8.9 | 33 |
| Merphos | | 8.2 | U | 8.2 | 33 |
| Methyl parathion | | 5.4 | U | 5.4 | 17 |
| Mevinphos | | 11 | U | 11 | 65 |
| Monochrotophos | | 84 | U | 84 | 330 |
| Naled | | 5.2 | U | 5.2 | 330 |
| Phorate | | 11 | U | 11 | 33 |
| Ronnel | | 7.9 | U | 7.9 | 33 |
| Stirophos | | 8.8 | U | 8.8 | 33 |
| Sulfotepp | | 5.3 | U | 5.3 | 17 |
| Tokuthion | | 7.6 | U | 7.6 | 33 |
| Trichloronate | | 8.1 | U | 8.1 | 330 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| Triphenylphosphate | 38 | | 35 - 134 |

# Analytical Data

Client: Environmental Engineering Consultant Job Number: 660-33914-1

**Client Sample ID: 4F**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33914-1 | Date Sampled: 02/17/2010 0930 |
| Client Matrix: | Water | Date Received: 02/19/2010 0850 |

## 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91479 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-90999 | Initial Weight/Volume: | 1030 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 03/05/2010 0451 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/23/2010 1625 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 2,4,5-T | 0.97 | U | 0.97 | 4.9 |
| 2,4-D | 0.97 | U | 0.97 | 4.9 |
| 2,4-DB | 0.97 | U | 0.97 | 4.9 |
| Dalapon | 24 | U J3 | 24 | 120 |
| Dicamba | 0.24 | U | 0.24 | 1.2 |
| Dichlorprop | 0.97 | U | 0.97 | 5.8 |
| Dinoseb | 0.97 | U | 0.97 | 5.8 |
| MCPA | 33 | U J3 | 33 | 120 |
| MCPP | 34 | U | 34 | 120 |
| Pentachlorophenol | 0.083 | U | 0.083 | 0.97 |
| Picloram | 0.97 | U | 0.97 | 4.9 |
| Silvex (2,4,5-TP) | 0.97 | U | 0.97 | 4.9 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 380 | J1 | 33 - 120 |

# Analytical Data

Client: Environmental Engineering Consultant Job Number: 660-33914-1

**Client Sample ID:** **4E**

| | | |
|---|---|---|
| Lab Sample ID: 660-33914-2 | | Date Sampled: 02/17/2010 1030 |
| Client Matrix: Water | | Date Received: 02/19/2010 0850 |

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### 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91479 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-90999 | Initial Weight/Volume: | 980 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 03/05/2010 0509 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/23/2010 1625 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 2,4,5-T | 1.0 | U | 1.0 | 5.1 |
| 2,4-D | 1.0 | U | 1.0 | 5.1 |
| 2,4-DB | 1.0 | U | 1.0 | 5.1 |
| Dalapon | 26 | U J3 | 26 | 120 |
| Dicamba | 0.26 | U | 0.26 | 1.2 |
| Dichlorprop | 1.0 | U | 1.0 | 6.1 |
| Dinoseb | 1.0 | U | 1.0 | 6.1 |
| MCPA | 35 | U J3 | 35 | 120 |
| MCPP | 36 | U | 36 | 120 |
| Pentachlorophenol | 0.087 | U | 0.087 | 1.0 |
| Picloram | 1.0 | U | 1.0 | 5.1 |
| Silvex (2,4,5-TP) | 1.0 | U | 1.0 | 5.1 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 85 | | 33 - 120 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Client Sample ID:** **4C**

Lab Sample ID: 660-33914-3

Client Matrix: Water

Date Sampled: 02/17/2010 1120

Date Received: 02/19/2010 0850

## 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91479 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-90999 | Initial Weight/Volume: | 1030 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 03/05/2010 0600 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/23/2010 1625 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 2,4,5-T | 0.97 | U | 0.97 | 4.9 |
| 2,4-D | 0.97 | U | 0.97 | 4.9 |
| 2,4-DB | 0.97 | U | 0.97 | 4.9 |
| Dalapon | 24 | U J3 | 24 | 120 |
| Dicamba | 0.24 | U | 0.24 | 1.2 |
| Dichlorprop | 0.97 | U | 0.97 | 5.8 |
| Dinoseb | 0.97 | U | 0.97 | 5.8 |
| MCPA | 33 | U J3 | 33 | 120 |
| MCPP | 34 | U | 34 | 120 |
| Pentachlorophenol | 0.083 | U | 0.083 | 0.97 |
| Picloram | 0.97 | U | 0.97 | 4.9 |
| Silvex (2,4,5-TP) | 0.97 | U | 0.97 | 4.9 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 87 | | 33 - 120 |

**Client Sample ID:** **10**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33914-4 | Date Sampled: | 02/17/2010 1230 |
| Client Matrix: | Water | Date Received: | 02/19/2010 0850 |

### 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91479 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-90999 | Initial Weight/Volume: | 1040 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 03/05/2010 0618 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/23/2010 1625 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 2,4,5-T | 0.96 | U | 0.96 | 4.8 |
| 2,4-D | 0.96 | U | 0.96 | 4.8 |
| 2,4-DB | 0.96 | U | 0.96 | 4.8 |
| Dalapon | 24 | U J3 | 24 | 120 |
| Dicamba | 0.24 | U | 0.24 | 1.2 |
| Dichlorprop | 0.96 | U | 0.96 | 5.8 |
| Dinoseb | 0.96 | U | 0.96 | 5.8 |
| MCPA | 33 | U J3 | 33 | 120 |
| MCPP | 34 | U | 34 | 120 |
| Pentachlorophenol | 0.082 | U | 0.082 | 0.96 |
| Picloram | 0.96 | U | 0.96 | 4.8 |
| Silvex (2,4,5-TP) | 0.96 | U | 0.96 | 4.8 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 118 | | 33 - 120 |

**Client Sample ID: 7A**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33914-5 | Date Sampled: 02/17/2010 1350 |
| Client Matrix: | Water | Date Received: 02/19/2010 0850 |

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### 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91479 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-90999 | Initial Weight/Volume: | 1050 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 03/05/2010 0635 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/23/2010 1625 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 2,4,5-T | 0.95 | U | 0.95 | 4.8 |
| 2,4-D | 0.95 | U | 0.95 | 4.8 |
| 2,4-DB | 0.95 | U | 0.95 | 4.8 |
| Dalapon | 24 | U J3 | 24 | 110 |
| Dicamba | 0.24 | U | 0.24 | 1.1 |
| Dichlorprop | 0.95 | U | 0.95 | 5.7 |
| Dinoseb | 0.95 | U | 0.95 | 5.7 |
| MCPA | 32 | U J3 | 32 | 110 |
| MCPP | 33 | U | 33 | 110 |
| Pentachlorophenol | 0.081 | U | 0.081 | 0.95 |
| Picloram | 0.95 | U | 0.95 | 4.8 |
| Silvex (2,4,5-TP) | 0.95 | U | 0.95 | 4.8 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 112 | | 33 - 120 |

**Client Sample ID:** **7B**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33914-6 | Date Sampled: | 02/17/2010 1430 |
| Client Matrix: | Water | Date Received: | 02/19/2010 0850 |

### 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91479 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-90999 | Initial Weight/Volume: | 990 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 03/05/2010 0653 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/23/2010 1625 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 2,4,5-T | 1.0 | U | 1.0 | 5.1 |
| 2,4-D | 1.0 | U | 1.0 | 5.1 |
| 2,4-DB | 1.0 | U | 1.0 | 5.1 |
| Dalapon | 25 | U J3 | 25 | 120 |
| Dicamba | 0.25 | U | 0.25 | 1.2 |
| Dichlorprop | 1.0 | U | 1.0 | 6.1 |
| Dinoseb | 1.0 | U | 1.0 | 6.1 |
| MCPA | 34 | U J3 | 34 | 120 |
| MCPP | 35 | U | 35 | 120 |
| Pentachlorophenol | 0.086 | U | 0.086 | 1.0 |
| Picloram | 1.0 | U | 1.0 | 5.1 |
| Silvex (2,4,5-TP) | 1.0 | U | 1.0 | 5.1 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 74 | | 33 - 120 |

**Client Sample ID:** **Surface Water Blank**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33914-7 | Date Sampled: 02/17/2010 0900 |
| Client Matrix: | Water | Date Received: 02/19/2010 0850 |

## 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91479 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-90999 | Initial Weight/Volume: | 960 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 03/05/2010 0710 | | Injection Volume: | 2 uL |
| Date Prepared: | 02/23/2010 1625 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| 2,4,5-T | 1.0 | U | 1.0 | 5.2 |
| 2,4-D | 1.0 | U | 1.0 | 5.2 |
| 2,4-DB | 1.0 | U | 1.0 | 5.2 |
| Dalapon | 26 | U J3 | 26 | 120 |
| Dicamba | 0.26 | U | 0.26 | 1.2 |
| Dichlorprop | 1.0 | U | 1.0 | 6.3 |
| Dinoseb | 1.0 | U | 1.0 | 6.3 |
| MCPA | 35 | U J3 | 35 | 120 |
| MCPP | 36 | U | 36 | 120 |
| Pentachlorophenol | 0.089 | U | 0.089 | 1.0 |
| Picloram | 1.0 | U | 1.0 | 5.2 |
| Silvex (2,4,5-TP) | 1.0 | U | 1.0 | 5.2 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 95 | | 33 - 120 |

## Analytical Data

Client: Environmental Engineering Consultant Job Number: 660-33914-1

**Client Sample ID: 4F**

Lab Sample ID: 660-33914-8 Date Sampled: 02/17/2010 0940
Client Matrix: Solid Date Received: 02/19/2010 0850

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### 8151A Herbicides (GC)

|  |  |  |  |  |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91563 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-91293 | Initial Weight/Volume: | 29.97 g |
| Dilution: | 1.0 |  | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 03/08/2010 2122 |  | Injection Volume: | 2 uL |
| Date Prepared: | 03/02/2010 1410 |  | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| 2,4,5-T |  | 10 | U | 10 | 50 |
| 2,4-D |  | 1.6 | U | 1.6 | 8.3 |
| 2,4-DB |  | 6.4 | U | 6.4 | 8.3 |
| Dalapon |  | 23 | U | 23 | 2000 |
| Dicamba |  | 12 | U | 12 | 50 |
| Dichlorprop |  | 25 | U | 25 | 100 |
| Dinoseb |  | 8.3 | U J3 | 8.3 | 30 |
| MCPA |  | 740 | U | 740 | 2000 |
| MCPP |  | 400 | U | 400 | 2000 |
| Pentachlorophenol |  | 5.0 | U | 5.0 | 17 |
| Picloram |  | 1.2 | U | 1.2 | 3.3 |
| Silvex (2,4,5-TP) |  | 10 | U | 10 | 50 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 74 |  | 10 - 135 |

**Client Sample ID:** **4E**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33914-9 | Date Sampled: 02/17/2010 1040 |
| Client Matrix: | Solid | Date Received: 02/19/2010 0850 |

### 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91563 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-91293 | Initial Weight/Volume: | 30.45 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 03/08/2010 2140 | | Injection Volume: | 2 uL |
| Date Prepared: | 03/02/2010 1410 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| 2,4,5-T | | 9.9 | U | 9.9 | 49 |
| 2,4-D | | 1.6 | U | 1.6 | 8.2 |
| 2,4-DB | | 6.3 | U | 6.3 | 8.2 |
| Dalapon | | 23 | U | 23 | 2000 |
| Dicamba | | 12 | U | 12 | 49 |
| Dichlorprop | | 25 | U | 25 | 99 |
| Dinoseb | | 8.2 | U J3 | 8.2 | 30 |
| MCPA | | 730 | U | 730 | 2000 |
| MCPP | | 390 | U | 390 | 2000 |
| Pentachlorophenol | | 4.9 | U | 4.9 | 17 |
| Picloram | | 1.2 | U | 1.2 | 3.3 |
| Silvex (2,4,5-TP) | | 9.9 | U | 9.9 | 49 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 73 | | 10 - 135 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Client Sample ID:** **10**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33914-10 | Date Sampled: 02/17/2010 1250 |
| Client Matrix: | Solid | Date Received: 02/19/2010 0850 |

## 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91563 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-91293 | Initial Weight/Volume: | 30.16 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 03/07/2010 1957 | | Injection Volume: | 2 uL |
| Date Prepared: | 03/02/2010 1410 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| 2,4,5-T | | 9.9 | U | 9.9 | 50 |
| 2,4-D | | 1.6 | U | 1.6 | 8.3 |
| 2,4-DB | | 6.4 | U | 6.4 | 8.3 |
| Dalapon | | 23 | U | 23 | 2000 |
| Dicamba | | 12 | U | 12 | 50 |
| Dichlorprop | | 25 | U | 25 | 99 |
| Dinoseb | | 8.3 | U J3 | 8.3 | 30 |
| MCPA | | 740 | U | 740 | 2000 |
| MCPP | | 400 | U | 400 | 2000 |
| Pentachlorophenol | | 5.0 | U | 5.0 | 17 |
| Picloram | | 1.2 | U | 1.2 | 3.3 |
| Silvex (2,4,5-TP) | | 9.9 | U | 9.9 | 50 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 272 | J1 | 10 - 135 |

**Client Sample ID: 7A**

| | | |
|---|---|---|
| Lab Sample ID: | 660-33914-11 | Date Sampled: 02/17/2010 1400 |
| Client Matrix: | Solid | Date Received: 02/19/2010 0850 |

### 8151A Herbicides (GC)

| | | | | |
|---|---|---|---|---|
| Method: | 8151A | Analysis Batch: 660-91563 | Instrument ID: | BSGJ |
| Preparation: | 8151A | Prep Batch: 660-91293 | Initial Weight/Volume: | 29.58 g |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 03/08/2010 2158 | | Injection Volume: | 2 uL |
| Date Prepared: | 03/02/2010 1410 | | Result Type: | PRIMARY |

| Analyte | DryWt Corrected: N | Result (ug/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| 2,4,5-T | | 10 | U | 10 | 51 |
| 2,4-D | | 1.6 | U | 1.6 | 8.4 |
| 2,4-DB | | 6.5 | U J3 | 6.5 | 8.4 |
| Dalapon | | 23 | U J3 | 23 | 2000 |
| Dicamba | | 12 | U | 12 | 51 |
| Dichlorprop | | 25 | U | 25 | 100 |
| Dinoseb | | 8.4 | U J3 | 8.4 | 30 |
| MCPA | | 750 | U | 750 | 2000 |
| MCPP | | 410 | U | 410 | 2000 |
| Pentachlorophenol | | 5.1 | U J3 | 5.1 | 17 |
| Picloram | | 1.2 | U | 1.2 | 3.3 |
| Silvex (2,4,5-TP) | | 10 | U J3 | 10 | 51 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|---|---|---|---|
| 2,4-Dichlorophenylacetic acid | 81 | | 10 - 135 |

# Analytical Data

Client: Environmental Engineering Consultant Job Number: 660-33914-1

**Client Sample ID: 4F**

Lab Sample ID: 660-33914-1
Client Matrix: Water

Date Sampled: 02/17/2010 0930
Date Received: 02/19/2010 0850

### 6010B Metals (ICP)-Total Recoverable

| | | | | |
|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-91268 | Instrument ID: | ICPA |
| Preparation: | 3005A | Prep Batch: 660-91157 | Lab File ID: | 10C02A |
| Dilution: | 1.0 | | Initial Weight/Volume: | 50 mL |
| Date Analyzed: | 03/02/2010 1148 | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/26/2010 0900 | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Copper | 0.018 | | 0.0029 | 0.010 |
| Iron | 1.4 | | 0.050 | 0.20 |
| Potassium | 8.6 | | 0.19 | 1.0 |
| Magnesium | 9.6 | | 0.020 | 0.080 |
| Lead | 0.0069 | I | 0.0020 | 0.010 |
| Zinc | 0.056 | | 0.0050 | 0.020 |

| | | | | |
|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-91268 | Instrument ID: | ICPA |
| Preparation: | 3005A | Prep Batch: 660-91157 | Lab File ID: | 10C02A |
| Dilution: | 10 | | Initial Weight/Volume: | 50 mL |
| Date Analyzed: | 03/02/2010 1411 | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/26/2010 0900 | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Sodium | 100 | | 3.1 | 5.0 |

### 7470A Mercury (CVAA)

| | | | | |
|---|---|---|---|---|
| Method: | 7470A | Analysis Batch: 700-79238 | Instrument ID: | LEEMAN HYDRA |
| Preparation: | 7470A | Prep Batch: 700-79169 | Lab File ID: | N/A |
| Dilution: | 1.0 | | Initial Weight/Volume: | 40 mL |
| Date Analyzed: | 02/24/2010 1801 | | Final Weight/Volume: | 40 mL |
| Date Prepared: | 02/24/2010 0915 | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Mercury | 0.000071 | U | 0.000071 | 0.00020 |

**Client Sample ID: 4E**

Lab Sample ID: 660-33914-2
Client Matrix: Water

Date Sampled: 02/17/2010 1030
Date Received: 02/19/2010 0850

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## 6010B Metals (ICP)-Total Recoverable

Method: 6010B
Preparation: 3005A
Dilution: 1.0
Date Analyzed: 03/02/2010 1154
Date Prepared: 02/26/2010 0900

Analysis Batch: 660-91268
Prep Batch: 660-91157

Instrument ID: ICPA
Lab File ID: 10C02A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Copper | 0.0029 | U | 0.0029 | 0.010 |
| Iron | 0.38 | | 0.050 | 0.20 |
| Potassium | 25 | | 0.19 | 1.0 |
| Magnesium | 66 | | 0.020 | 0.080 |
| Lead | 0.0036 | I | 0.0020 | 0.010 |
| Zinc | 0.016 | I | 0.0050 | 0.020 |

Method: 6010B
Preparation: 3005A
Dilution: 10
Date Analyzed: 03/02/2010 1417
Date Prepared: 02/26/2010 0900

Analysis Batch: 660-91268
Prep Batch: 660-91157

Instrument ID: ICPA
Lab File ID: 10C02A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Sodium | 300 | | 3.1 | 5.0 |

---

## 7470A Mercury (CVAA)

Method: 7470A
Preparation: 7470A
Dilution: 1.0
Date Analyzed: 02/24/2010 1803
Date Prepared: 02/24/2010 0915

Analysis Batch: 700-79238
Prep Batch: 700-79169

Instrument ID: LEEMAN HYDRA
Lab File ID: N/A
Initial Weight/Volume: 40 mL
Final Weight/Volume: 40 mL

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Mercury | 0.000071 | U | 0.000071 | 0.00020 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Client Sample ID:** **4C**

Lab Sample ID: 660-33914-3

Client Matrix: Water

Date Sampled: 02/17/2010 1120

Date Received: 02/19/2010 0850

## 6010B Metals (ICP)-Total Recoverable

Method: 6010B
Preparation: 3005A
Dilution: 1.0
Date Analyzed: 03/02/2010 1200
Date Prepared: 02/26/2010 0900
Analysis Batch: 660-91268
Prep Batch: 660-91157
Instrument ID: ICPA
Lab File ID: 10C02A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Copper | 0.0029 | U | 0.0029 | 0.010 |
| Iron | 0.063 | I | 0.050 | 0.20 |
| Potassium | 30 | | 0.19 | 1.0 |
| Magnesium | 63 | | 0.020 | 0.080 |
| Lead | 0.0020 | U | 0.0020 | 0.010 |
| Zinc | 0.0097 | I | 0.0050 | 0.020 |

Method: 6010B
Preparation: 3005A
Dilution: 10
Date Analyzed: 03/02/2010 1423
Date Prepared: 02/26/2010 0900
Analysis Batch: 660-91268
Prep Batch: 660-91157
Instrument ID: ICPA
Lab File ID: 10C02A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Sodium | 320 | | 3.1 | 5.0 |

## 7470A Mercury (CVAA)

Method: 7470A
Preparation: 7470A
Dilution: 1.0
Date Analyzed: 02/24/2010 1805
Date Prepared: 02/24/2010 0915
Analysis Batch: 700-79238
Prep Batch: 700-79169
Instrument ID: LEEMAN HYDRA
Lab File ID: N/A
Initial Weight/Volume: 40 mL
Final Weight/Volume: 40 mL

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Mercury | 0.000071 | U | 0.000071 | 0.00020 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Client Sample ID:** **10**

Lab Sample ID: 660-33914-4
Client Matrix: Water

Date Sampled: 02/17/2010 1230
Date Received: 02/19/2010 0850

## 6010B Metals (ICP)-Total Recoverable

Method: 6010B
Preparation: 3005A
Dilution: 1.0
Date Analyzed: 03/02/2010 1218
Date Prepared: 02/26/2010 0900

Analysis Batch: 660-91268
Prep Batch: 660-91157

Instrument ID: ICPA
Lab File ID: 10C02A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Copper | 0.0029 | U | 0.0029 | 0.010 |
| Iron | 0.075 | I | 0.050 | 0.20 |
| Magnesium | 97 | | 0.020 | 0.080 |
| Lead | 0.0020 | U | 0.0020 | 0.010 |
| Zinc | 0.0078 | I | 0.0050 | 0.020 |

Method: 6010B
Preparation: 3005A
Dilution: 10
Date Analyzed: 03/02/2010 1429
Date Prepared: 02/26/2010 0900

Analysis Batch: 660-91268
Prep Batch: 660-91157

Instrument ID: ICPA
Lab File ID: 10C02A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Potassium | 32 | | 1.9 | 10 |
| Sodium | 590 | | 3.1 | 5.0 |

## 7470A Mercury (CVAA)

Method: 7470A
Preparation: 7470A
Dilution: 1.0
Date Analyzed: 02/24/2010 1811
Date Prepared: 02/24/2010 0915

Analysis Batch: 700-79238
Prep Batch: 700-79169

Instrument ID: LEEMAN HYDRA
Lab File ID: N/A
Initial Weight/Volume: 40 mL
Final Weight/Volume: 40 mL

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Mercury | 0.000071 | U | 0.000071 | 0.00020 |

**Client Sample ID:** **7A**

Lab Sample ID: 660-33914-5
Client Matrix: Water

Date Sampled: 02/17/2010 1350
Date Received: 02/19/2010 0850

### 6010B Metals (ICP)-Total Recoverable

| | | | | | |
|---|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-91268 | | Instrument ID: | ICPA |
| Preparation: | 3005A | Prep Batch: 660-91157 | | Lab File ID: | 10C02A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 50 mL |
| Date Analyzed: | 03/02/2010 1224 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/26/2010 0900 | | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Copper | 0.0029 | U | 0.0029 | 0.010 |
| Iron | 0.11 | I | 0.050 | 0.20 |
| Magnesium | 96 | | 0.020 | 0.080 |
| Lead | 0.0020 | U | 0.0020 | 0.010 |
| Zinc | 0.0082 | I | 0.0050 | 0.020 |

| | | | | | |
|---|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-91268 | | Instrument ID: | ICPA |
| Preparation: | 3005A | Prep Batch: 660-91157 | | Lab File ID: | 10C02A |
| Dilution: | 10 | | | Initial Weight/Volume: | 50 mL |
| Date Analyzed: | 03/02/2010 1447 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/26/2010 0900 | | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Potassium | 31 | | 1.9 | 10 |
| Sodium | 580 | | 3.1 | 5.0 |

### 7470A Mercury (CVAA)

| | | | | | |
|---|---|---|---|---|---|
| Method: | 7470A | Analysis Batch: 700-79238 | | Instrument ID: | LEEMAN HYDRA |
| Preparation: | 7470A | Prep Batch: 700-79169 | | Lab File ID: | N/A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 40 mL |
| Date Analyzed: | 02/24/2010 1813 | | | Final Weight/Volume: | 40 mL |
| Date Prepared: | 02/24/2010 0915 | | | | |

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Mercury | 0.000071 | U | 0.000071 | 0.00020 |

**Client Sample ID: 7B**

Lab Sample ID: 660-33914-6
Client Matrix: Water
Date Sampled: 02/17/2010 1430
Date Received: 02/19/2010 0850

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## 6010B Metals (ICP)-Total Recoverable

Method: 6010B
Preparation: 3005A
Dilution: 1.0
Date Analyzed: 03/02/2010 1230
Date Prepared: 02/26/2010 0900
Analysis Batch: 660-91268
Prep Batch: 660-91157
Instrument ID: ICPA
Lab File ID: 10C02A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Copper | 0.0029 | U | 0.0029 | 0.010 |
| Iron | 0.067 | I | 0.050 | 0.20 |
| Magnesium | 97 | | 0.020 | 0.080 |
| Lead | 0.0020 | U | 0.0020 | 0.010 |
| Zinc | 0.0093 | I | 0.0050 | 0.020 |

Method: 6010B
Preparation: 3005A
Dilution: 10
Date Analyzed: 03/02/2010 1453
Date Prepared: 02/26/2010 0900
Analysis Batch: 660-91268
Prep Batch: 660-91157
Instrument ID: ICPA
Lab File ID: 10C02A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Potassium | 32 | | 1.9 | 10 |
| Sodium | 590 | | 3.1 | 5.0 |

---

## 7470A Mercury (CVAA)

Method: 7470A
Preparation: 7470A
Dilution: 1.0
Date Analyzed: 02/24/2010 1815
Date Prepared: 02/24/2010 0915
Analysis Batch: 700-79238
Prep Batch: 700-79169
Instrument ID: LEEMAN HYDRA
Lab File ID: N/A
Initial Weight/Volume: 40 mL
Final Weight/Volume: 40 mL

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Mercury | 0.000071 | U | 0.000071 | 0.00020 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Client Sample ID:** **Surface Water Blank**

Lab Sample ID: 660-33914-7

Client Matrix: Water

Date Sampled: 02/17/2010 0900

Date Received: 02/19/2010 0850

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## 6010B Metals (ICP)-Total Recoverable

Method: 6010B
Preparation: 3005A
Dilution: 1.0
Date Analyzed: 03/02/2010 1236
Date Prepared: 02/26/2010 0900

Analysis Batch: 660-91268
Prep Batch: 660-91157

Instrument ID: ICPA
Lab File ID: 10C02A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Copper | 0.0029 | U | 0.0029 | 0.010 |
| Iron | 0.050 | U | 0.050 | 0.20 |
| Potassium | 0.19 | U | 0.19 | 1.0 |
| Magnesium | 0.020 | U | 0.020 | 0.080 |
| Sodium | 9.7 |  | 0.31 | 0.50 |
| Lead | 0.0020 | U | 0.0020 | 0.010 |
| Zinc | 0.0050 | U | 0.0050 | 0.020 |

---

## 7470A Mercury (CVAA)

Method: 7470A
Preparation: 7470A
Dilution: 1.0
Date Analyzed: 02/24/2010 1817
Date Prepared: 02/24/2010 0915

Analysis Batch: 700-79238
Prep Batch: 700-79169

Instrument ID: LEEMAN HYDRA
Lab File ID: N/A
Initial Weight/Volume: 40 mL
Final Weight/Volume: 40 mL

| Analyte | Result (mg/L) | Qualifier | MDL | PQL |
|---|---|---|---|---|
| Mercury | 0.000071 | U | 0.000071 | 0.00020 |

**Client Sample ID:** **4F**

Lab Sample ID: 660-33914-8    Date Sampled: 02/17/2010 0940
Client Matrix: Solid    Date Received: 02/19/2010 0850

### 6010B Metals (ICP)

Method: 6010B    Analysis Batch: 660-91239    Instrument ID: ICPA
Preparation: 3050B    Prep Batch: 660-90981    Lab File ID: 10C01A
Dilution: 4.0    Initial Weight/Volume: 1.03 g
Date Analyzed: 03/01/2010 1252    Final Weight/Volume: 50 mL
Date Prepared: 02/23/2010 1202

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Aluminum | | 3200 | | 23 | 78 |
| Arsenic | | 1.6 | I | 0.89 | 1.9 |
| Boron | | 8.7 | I | 2.3 | 19 |
| Barium | | 26 | | 0.62 | 3.9 |
| Cadmium | | 0.34 | U | 0.34 | 1.9 |
| Cobalt | | 1.3 | I | 0.74 | 3.9 |
| Chromium | | 9.2 | | 0.66 | 3.9 |
| Copper | | 23 | | 1.9 | 7.8 |
| Iron | | 2900 | | 12 | 19 |
| Magnesium | | 3300 | | 26 | 190 |
| Manganese | | 65 | | 0.82 | 3.9 |
| Sodium | | 970 | | 70 | 190 |
| Lead | | 33 | | 0.58 | 1.9 |
| Titanium | | 27 | | 1.2 | 3.9 |
| Vanadium | | 6.4 | | 0.43 | 3.9 |
| Zinc | | 94 | | 1.9 | 7.8 |

Method: 6010B    Analysis Batch: 660-91239    Instrument ID: ICPA
Preparation: 3050B    Prep Batch: 660-90981    Lab File ID: 10C01A
Dilution: 20    Initial Weight/Volume: 1.03 g
Date Analyzed: 03/01/2010 1339    Final Weight/Volume: 50 mL
Date Prepared: 02/23/2010 1202

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Calcium | | 210000 | | 290 | 970 |
| Strontium | | 2000 | | 1.9 | 19 |

### 7471A Mercury (CVAA)

Method: 7471A    Analysis Batch: 700-79230    Instrument ID: LEEMAN HYDRA
Preparation: 7471A    Prep Batch: 700-79182    Lab File ID: N/A
Dilution: 1.0    Initial Weight/Volume: 0.79 g
Date Analyzed: 02/24/2010 1659    Final Weight/Volume: 40 mL
Date Prepared: 02/24/2010 1100

| Analyte | DryWt Corrected: Y | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Mercury | | 0.015 | I | 0.010 | 0.015 |

# Analytical Data

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Client Sample ID:** **4E**

Lab Sample ID: 660-33914-9
Client Matrix: Solid

Date Sampled: 02/17/2010 1040
Date Received: 02/19/2010 0850

## 6010B Metals (ICP)

Method: 6010B
Preparation: 3050B
Dilution: 4.0
Date Analyzed: 03/01/2010 1258
Date Prepared: 02/23/2010 1202

Analysis Batch: 660-91239
Prep Batch: 660-90981

Instrument ID: ICPA
Lab File ID: 10C01A
Initial Weight/Volume: 1.04 g
Final Weight/Volume: 50 mL

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Aluminum | | 3200 | | 22 | 77 |
| Arsenic | | 1.1 | I | 0.88 | 1.9 |
| Boron | | 12 | I | 2.3 | 19 |
| Barium | | 15 | | 0.62 | 3.8 |
| Cadmium | | 0.33 | U | 0.33 | 1.9 |
| Cobalt | | 0.82 | I | 0.73 | 3.8 |
| Chromium | | 4.8 | | 0.65 | 3.8 |
| Copper | | 12 | | 1.9 | 7.7 |
| Iron | | 2600 | | 12 | 19 |
| Magnesium | | 4200 | | 26 | 190 |
| Manganese | | 44 | | 0.81 | 3.8 |
| Sodium | | 1300 | | 69 | 190 |
| Lead | | 53 | | 0.58 | 1.9 |
| Titanium | | 40 | | 1.2 | 3.8 |
| Vanadium | | 5.4 | | 0.42 | 3.8 |
| Zinc | | 74 | | 1.9 | 7.7 |

Method: 6010B
Preparation: 3050B
Dilution: 20
Date Analyzed: 03/01/2010 1345
Date Prepared: 02/23/2010 1202

Analysis Batch: 660-91239
Prep Batch: 660-90981

Instrument ID: ICPA
Lab File ID: 10C01A
Initial Weight/Volume: 1.04 g
Final Weight/Volume: 50 mL

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Calcium | | 150000 | | 290 | 960 |
| Strontium | | 2200 | | 1.9 | 19 |

## 7471A Mercury (CVAA)

Method: 7471A
Preparation: 7471A
Dilution: 1.0
Date Analyzed: 02/24/2010 1701
Date Prepared: 02/24/2010 1100

Analysis Batch: 700-79230
Prep Batch: 700-79182

Instrument ID: LEEMAN HYDRA
Lab File ID: N/A
Initial Weight/Volume: 1.00 g
Final Weight/Volume: 40 mL

| Analyte | DryWt Corrected: Y | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Mercury | | 0.016 | I | 0.012 | 0.016 |

**Client Sample ID:** **10**

Lab Sample ID: 660-33914-10
Client Matrix: Solid

Date Sampled: 02/17/2010 1250
Date Received: 02/19/2010 0850

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### 6010B Metals (ICP)

Method: 6010B
Preparation: 3050B
Dilution: 1.0
Date Analyzed: 03/01/2010 1327
Date Prepared: 02/23/2010 1202

Analysis Batch: 660-91239
Prep Batch: 660-90981

Instrument ID: ICPA
Lab File ID: 10C01A
Initial Weight/Volume: 1.02 g
Final Weight/Volume: 50 mL

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Aluminum | | 1200 | | 5.7 | 20 |
| Arsenic | | 0.44 | I | 0.23 | 0.49 |
| Boron | | 5.4 | | 0.58 | 4.9 |
| Barium | | 5.2 | | 0.16 | 0.98 |
| Calcium | | 14000 | | 15 | 49 |
| Cadmium | | 0.085 | U | 0.085 | 0.49 |
| Cobalt | | 0.25 | I | 0.19 | 0.98 |
| Chromium | | 1.1 | | 0.17 | 0.98 |
| Copper | | 3.6 | | 0.49 | 2.0 |
| Iron | | 850 | | 2.9 | 4.9 |
| Magnesium | | 1300 | | 6.7 | 49 |
| Manganese | | 21 | | 0.21 | 0.98 |
| Sodium | | 960 | | 18 | 49 |
| Lead | | 16 | | 0.15 | 0.49 |
| Titanium | | 27 | | 0.29 | 0.98 |
| Vanadium | | 2.9 | | 0.11 | 0.98 |
| Zinc | | 8.2 | | 0.49 | 2.0 |

Method: 6010B
Preparation: 3050B
Dilution: 10
Date Analyzed: 03/01/2010 1351
Date Prepared: 02/23/2010 1202

Analysis Batch: 660-91239
Prep Batch: 660-90981

Instrument ID: ICPA
Lab File ID: 10C01A
Initial Weight/Volume: 1.02 g
Final Weight/Volume: 50 mL

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Strontium | | 660 | | 0.96 | 9.8 |

---

### 7471A Mercury (CVAA)

Method: 7471A
Preparation: 7471A
Dilution: 1.0
Date Analyzed: 02/24/2010 1703
Date Prepared: 02/24/2010 1100

Analysis Batch: 700-79230
Prep Batch: 700-79182

Instrument ID: LEEMAN HYDRA
Lab File ID: N/A
Initial Weight/Volume: 1.55 g
Final Weight/Volume: 40 mL

| Analyte | DryWt Corrected: Y | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Mercury | | 0.037 | U | 0.037 | 0.053 |

**Client Sample ID: 7A**

Lab Sample ID: 660-33914-11    Date Sampled: 02/17/2010 1400
Client Matrix: Solid    Date Received: 02/19/2010 0850

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### 6010B Metals (ICP)

| | | | | | |
|---|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-91239 | | Instrument ID: | ICPA |
| Preparation: | 3050B | Prep Batch: 660-90981 | | Lab File ID: | 10C01A |
| Dilution: | 4.0 | | | Initial Weight/Volume: | 1.03 g |
| Date Analyzed: | 03/01/2010 1333 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/23/2010 1202 | | | | |

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Aluminum | | 1200 | | 23 | 78 |
| Arsenic | | 0.89 | U | 0.89 | 1.9 |
| Boron | | 8.0 | I | 2.3 | 19 |
| Barium | | 5.8 | | 0.62 | 3.9 |
| Cadmium | | 0.34 | U | 0.34 | 1.9 |
| Cobalt | | 0.74 | U | 0.74 | 3.9 |
| Chromium | | 1.7 | I | 0.66 | 3.9 |
| Copper | | 2.7 | I | 1.9 | 7.8 |
| Iron | | 860 | | 12 | 19 |
| Magnesium | | 1700 | | 26 | 190 |
| Manganese | | 27 | | 0.82 | 3.9 |
| Sodium | | 1500 | | 70 | 190 |
| Lead | | 5.2 | | 0.58 | 1.9 |
| Titanium | | 3.4 | I | 1.2 | 3.9 |
| Vanadium | | 2.2 | I | 0.43 | 3.9 |
| Zinc | | 6.2 | I | 1.9 | 7.8 |

| | | | | | |
|---|---|---|---|---|---|
| Method: | 6010B | Analysis Batch: 660-91239 | | Instrument ID: | ICPA |
| Preparation: | 3050B | Prep Batch: 660-90981 | | Lab File ID: | 10C01A |
| Dilution: | 20 | | | Initial Weight/Volume: | 1.03 g |
| Date Analyzed: | 03/01/2010 1357 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/23/2010 1202 | | | | |

| Analyte | DryWt Corrected: N | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Calcium | | 160000 | | 290 | 970 |
| Strontium | | 2000 | | 1.9 | 19 |

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### 7471A Mercury (CVAA)

| | | | | | |
|---|---|---|---|---|---|
| Method: | 7471A | Analysis Batch: 700-79230 | | Instrument ID: | LEEMAN HYDRA |
| Preparation: | 7471A | Prep Batch: 700-79182 | | Lab File ID: | N/A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 0.93 g |
| Date Analyzed: | 02/24/2010 1705 | | | Final Weight/Volume: | 40 mL |
| Date Prepared: | 02/24/2010 1100 | | | | |

| Analyte | DryWt Corrected: Y | Result (mg/Kg) | Qualifier | MDL | PQL |
|---|---|---|---|---|---|
| Mercury | | 0.015 | U | 0.015 | 0.021 |

## General Chemistry

**Client Sample ID:** **4F**

Lab Sample ID: 660-33914-1
Client Matrix: Water

Date Sampled: 02/17/2010 0930
Date Received: 02/19/2010 0850

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Nitrite as N | 0.10 | U Q | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| Analysis Batch: 660-90874 | | Date Analyzed: 02/19/2010 0955 | | | | | |
| Nitrate as N | 0.10 | U Q | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| Analysis Batch: 660-90874 | | Date Analyzed: 02/19/2010 0955 | | | | | |
| Phosphorus, Total | 1.3 | | mg/L | 0.10 | 0.30 | 1.0 | 365.4 |
| Analysis Batch: 660-91349 | | Date Analyzed: 03/03/2010 1113 | | | | | |
| Prep Batch: 660-91250 | | Date Prepared: 03/01/2010 1700 | | | | | |
| Sulfate | 2.0 | U | mg/L | 2.0 | 5.0 | 1.0 | SM 426C |
| Analysis Batch: 660-91434 | | Date Analyzed: 03/04/2010 1100 | | | | | |
| Chloride | 150 | | mg/L | 6.0 | 10 | 2.0 | SM 4500 Cl- E |
| Analysis Batch: 660-91210 | | Date Analyzed: 02/27/2010 0946 | | | | | |
| Chemical Oxygen Demand | 460 | J3 | mg/L | 10 | 20 | 1.0 | SM 5220D |
| Analysis Batch: 660-91054 | | Date Analyzed: 02/24/2010 1445 | | | | | |
| Prep Batch: 660-91053 | | Date Prepared: 02/24/2010 1113 | | | | | |
| Tannins and Lignins | 5.9 | | mg/L | 0.37 | 1.0 | 10 | SM 5550B |
| Analysis Batch: 680-161926 | | Date Analyzed: 02/26/2010 1752 | | | | | |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Turbidity | 280 | Q | NTU | 5.0 | 5.0 | 50 | 180.1 |
| Analysis Batch: 660-90881 | | Date Analyzed: 02/19/2010 1030 | | | | | |
| Chlorophyll a | 98.9 | Q | ug/L | 2.00 | 2.00 | 1.0 | SM 10200H |
| Analysis Batch: 660-91277 | | Date Analyzed: 02/25/2010 0926 | | | | | |
| Alkalinity | 160 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2320B |
| Analysis Batch: 660-91047 | | Date Analyzed: 02/24/2010 1253 | | | | | |
| Salinity | 2.0 | U | ppt | 2.0 | 2.0 | 1.0 | SM 2520B |
| Analysis Batch: 660-91136 | | Date Analyzed: 02/25/2010 1200 | | | | | |
| Total Suspended Solids | 110 | | mg/L | 1.7 | 1.7 | 1.0 | SM 2540D |
| Analysis Batch: 660-91018 | | Date Analyzed: 02/24/2010 0847 | | | | | |
| Sulfide | 5.3 | | mg/L | 1.0 | 1.0 | 1.0 | SM 4500 S2 F |
| Analysis Batch: 660-90921 | | Date Analyzed: 02/20/2010 1400 | | | | | |
| Biochemical Oxygen Demand | 88.8 | Q | mg/L | 2.00 | 2.00 | 1.0 | SM 5210B |
| Analysis Batch: 660-91308 | | Date Analyzed: 02/24/2010 0835 | | | | | |

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### General Chemistry

**Client Sample ID:** **4E**

Lab Sample ID: 660-33914-2
Client Matrix: Water

Date Sampled: 02/17/2010 1030
Date Received: 02/19/2010 0850

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Nitrite as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| Analysis Batch: 660-90874 | | Date Analyzed: 02/19/2010 0955 | | | | | |
| Nitrate as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| Analysis Batch: 660-90874 | | Date Analyzed: 02/19/2010 0955 | | | | | |
| Phosphorus, Total | 0.21 | I | mg/L | 0.10 | 0.30 | 1.0 | 365.4 |
| Analysis Batch: 660-91349 | | Date Analyzed: 03/03/2010 1113 | | | | | |
| Prep Batch: 660-91250 | | Date Prepared: 03/01/2010 1700 | | | | | |
| Sulfate | 88 | | mg/L | 10 | 25 | 5.0 | SM 426C |
| Analysis Batch: 660-91434 | | Date Analyzed: 03/04/2010 1100 | | | | | |
| Chloride | 490 | | mg/L | 30 | 50 | 10 | SM 4500 Cl- E |
| Analysis Batch: 660-91210 | | Date Analyzed: 02/27/2010 0946 | | | | | |
| Chemical Oxygen Demand | 41 | | mg/L | 10 | 20 | 1.0 | SM 5220D |
| Analysis Batch: 660-91052 | | Date Analyzed: 02/24/2010 1413 | | | | | |
| Prep Batch: 660-91051 | | Date Prepared: 02/24/2010 1113 | | | | | |
| Tannins and Lignins | 1.5 | | mg/L | 0.037 | 0.10 | 1.0 | SM 5550B |
| Analysis Batch: 680-161926 | | Date Analyzed: 02/26/2010 1749 | | | | | |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Turbidity | 17 | | NTU | 0.10 | 0.10 | 1.0 | 180.1 |
| Analysis Batch: 660-90881 | | Date Analyzed: 02/19/2010 1030 | | | | | |
| Chlorophyll a | 3.20 | Q | ug/L | 2.00 | 2.00 | 1.0 | SM 10200H |
| Analysis Batch: 660-91277 | | Date Analyzed: 02/25/2010 0928 | | | | | |
| Alkalinity | 430 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2320B |
| Analysis Batch: 660-91047 | | Date Analyzed: 02/24/2010 1306 | | | | | |
| Salinity | 2.0 | U | ppt | 2.0 | 2.0 | 1.0 | SM 2520B |
| Analysis Batch: 660-91136 | | Date Analyzed: 02/25/2010 1200 | | | | | |
| Total Suspended Solids | 44 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2540D |
| Analysis Batch: 660-91018 | | Date Analyzed: 02/24/2010 0847 | | | | | |
| Sulfide | 1.0 | U | mg/L | 1.0 | 1.0 | 1.0 | SM 4500 S2 F |
| Analysis Batch: 660-90921 | | Date Analyzed: 02/20/2010 1400 | | | | | |
| Biochemical Oxygen Demand | 3.60 | Q | mg/L | 2.00 | 2.00 | 1.0 | SM 5210B |
| Analysis Batch: 660-91308 | | Date Analyzed: 02/24/2010 0835 | | | | | |

# Analytical Data

Client: Environmental Engineering Consultant  Job Number: 660-33914-1

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## General Chemistry

**Client Sample ID:** **4C**

Lab Sample ID: 660-33914-3  Date Sampled: 02/17/2010 1120
Client Matrix: Water  Date Received: 02/19/2010 0850

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Nitrite as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| | Analysis Batch: 660-90874 | Date Analyzed: 02/19/2010 0955 | | | | | |
| Nitrate as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| | Analysis Batch: 660-90874 | Date Analyzed: 02/19/2010 0955 | | | | | |
| Phosphorus, Total | 0.21 | I | mg/L | 0.10 | 0.30 | 1.0 | 365.4 |
| | Analysis Batch: 660-91349 | Date Analyzed: 03/03/2010 1113 | | | | | |
| | Prep Batch: 660-91250 | Date Prepared: 03/01/2010 1700 | | | | | |
| Sulfate | 62 | | mg/L | 4.0 | 10 | 2.0 | SM 426C |
| | Analysis Batch: 660-91434 | Date Analyzed: 03/04/2010 1100 | | | | | |
| Chloride | 510 | | mg/L | 30 | 50 | 10 | SM 4500 Cl- E |
| | Analysis Batch: 660-91210 | Date Analyzed: 02/27/2010 0946 | | | | | |
| Chemical Oxygen Demand | 56 | | mg/L | 10 | 20 | 1.0 | SM 5220D |
| | Analysis Batch: 660-91052 | Date Analyzed: 02/24/2010 1413 | | | | | |
| | Prep Batch: 660-91051 | Date Prepared: 02/24/2010 1113 | | | | | |
| Tannins and Lignins | 3.0 | | mg/L | 0.18 | 0.50 | 5.0 | SM 5550B |
| | Analysis Batch: 680-161926 | Date Analyzed: 02/26/2010 1752 | | | | | |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Turbidity | 11 | | NTU | 0.10 | 0.10 | 1.0 | 180.1 |
| | Analysis Batch: 660-90881 | Date Analyzed: 02/19/2010 1030 | | | | | |
| Chlorophyll a | 91.8 | Q | ug/L | 2.00 | 2.00 | 1.0 | SM 10200H |
| | Analysis Batch: 660-91277 | Date Analyzed: 02/25/2010 0929 | | | | | |
| Alkalinity | 530 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2320B |
| | Analysis Batch: 660-91047 | Date Analyzed: 02/24/2010 1313 | | | | | |
| Salinity | 2.0 | U | ppt | 2.0 | 2.0 | 1.0 | SM 2520B |
| | Analysis Batch: 660-91136 | Date Analyzed: 02/25/2010 1200 | | | | | |
| Total Suspended Solids | 8.8 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2540D |
| | Analysis Batch: 660-91018 | Date Analyzed: 02/24/2010 0847 | | | | | |
| Sulfide | 1.1 | | mg/L | 1.0 | 1.0 | 1.0 | SM 4500 S2 F |
| | Analysis Batch: 660-90921 | Date Analyzed: 02/20/2010 1400 | | | | | |
| Biochemical Oxygen Demand | 10.3 | Q | mg/L | 2.00 | 2.00 | 1.0 | SM 5210B |
| | Analysis Batch: 660-91308 | Date Analyzed: 02/24/2010 0835 | | | | | |

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### General Chemistry

**Client Sample ID:** **10**

| | | | |
|---|---|---|---|
| Lab Sample ID: | 660-33914-4 | Date Sampled: | 02/17/2010 1230 |
| Client Matrix: | Water | Date Received: | 02/19/2010 0850 |

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Nitrite as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| Analysis Batch: 660-90874 | Date Analyzed: 02/19/2010 0955 | | | | | | |
| Nitrate as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| Analysis Batch: 660-90874 | Date Analyzed: 02/19/2010 0955 | | | | | | |
| Phosphorus, Total | 0.10 | U | mg/L | 0.10 | 0.30 | 1.0 | 365.4 |
| Analysis Batch: 660-91349 | Date Analyzed: 03/03/2010 1113 | | | | | | |
| Prep Batch: 660-91250 | Date Prepared: 03/01/2010 1700 | | | | | | |
| Sulfate | 150 | | mg/L | 10 | 25 | 5.0 | SM 426C |
| Analysis Batch: 660-91434 | Date Analyzed: 03/04/2010 1100 | | | | | | |
| Chloride | 1200 | | mg/L | 60 | 100 | 20 | SM 4500 Cl- E |
| Analysis Batch: 660-91210 | Date Analyzed: 02/27/2010 0946 | | | | | | |
| Chemical Oxygen Demand | 49 | J3 | mg/L | 10 | 20 | 1.0 | SM 5220D |
| Analysis Batch: 660-91052 | Date Analyzed: 02/24/2010 1413 | | | | | | |
| Prep Batch: 660-91051 | Date Prepared: 02/24/2010 1113 | | | | | | |
| Tannins and Lignins | 1.6 | | mg/L | 0.037 | 0.10 | 1.0 | SM 5550B |
| Analysis Batch: 680-161926 | Date Analyzed: 02/26/2010 1749 | | | | | | |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Turbidity | 4.1 | | NTU | 0.10 | 0.10 | 1.0 | 180.1 |
| Analysis Batch: 660-90881 | Date Analyzed: 02/19/2010 1030 | | | | | | |
| Chlorophyll a | 15.0 | Q | ug/L | 2.00 | 2.00 | 1.0 | SM 10200H |
| Analysis Batch: 660-91277 | Date Analyzed: 02/25/2010 0930 | | | | | | |
| Alkalinity | 440 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2320B |
| Analysis Batch: 660-91047 | Date Analyzed: 02/24/2010 1321 | | | | | | |
| Salinity | 2.5 | | ppt | 2.0 | 2.0 | 1.0 | SM 2520B |
| Analysis Batch: 660-91136 | Date Analyzed: 02/25/2010 1200 | | | | | | |
| Total Suspended Solids | 8.0 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2540D |
| Analysis Batch: 660-91018 | Date Analyzed: 02/24/2010 0847 | | | | | | |
| Sulfide | 1.0 | U | mg/L | 1.0 | 1.0 | 1.0 | SM 4500 S2 F |
| Analysis Batch: 660-90921 | Date Analyzed: 02/20/2010 1400 | | | | | | |
| Biochemical Oxygen Demand | 2.95 | Q | mg/L | 2.00 | 2.00 | 1.0 | SM 5210B |
| Analysis Batch: 660-91308 | Date Analyzed: 02/24/2010 0835 | | | | | | |

### General Chemistry

**Client Sample ID:** **7A**

Lab Sample ID: 660-33914-5
Client Matrix: Water

Date Sampled: 02/17/2010 1350
Date Received: 02/19/2010 0850

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Nitrite as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| Analysis Batch: 660-90874 | Date Analyzed: 02/19/2010 0955 | | | | | | |
| Nitrate as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| Analysis Batch: 660-90874 | Date Analyzed: 02/19/2010 0955 | | | | | | |
| Phosphorus, Total | 0.11 | I | mg/L | 0.10 | 0.30 | 1.0 | 365.4 |
| Analysis Batch: 660-91349 | Date Analyzed: 03/03/2010 1113 | | | | | | |
| Prep Batch: 660-91250 | Date Prepared: 03/01/2010 1700 | | | | | | |
| Sulfate | 160 | | mg/L | 10 | 25 | 5.0 | SM 426C |
| Analysis Batch: 660-91434 | Date Analyzed: 03/04/2010 1100 | | | | | | |
| Chloride | 1100 | | mg/L | 60 | 100 | 20 | SM 4500 Cl- E |
| Analysis Batch: 660-91210 | Date Analyzed: 02/27/2010 0946 | | | | | | |
| Chemical Oxygen Demand | 51 | | mg/L | 10 | 20 | 1.0 | SM 5220D |
| Analysis Batch: 660-91052 | Date Analyzed: 02/24/2010 1413 | | | | | | |
| Prep Batch: 660-91051 | Date Prepared: 02/24/2010 1113 | | | | | | |
| Tannins and Lignins | 1.6 | | mg/L | 0.037 | 0.10 | 1.0 | SM 5550B |
| Analysis Batch: 680-161926 | Date Analyzed: 02/26/2010 1749 | | | | | | |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Turbidity | 4.6 | | NTU | 0.10 | 0.10 | 1.0 | 180.1 |
| Analysis Batch: 660-90881 | Date Analyzed: 02/19/2010 1030 | | | | | | |
| Chlorophyll a | 37.2 | | ug/L | 2.00 | 2.00 | 1.0 | SM 10200H |
| Analysis Batch: 660-91277 | Date Analyzed: 02/25/2010 0931 | | | | | | |
| Alkalinity | 420 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2320B |
| Analysis Batch: 660-91047 | Date Analyzed: 02/24/2010 1329 | | | | | | |
| Salinity | 2.5 | | ppt | 2.0 | 2.0 | 1.0 | SM 2520B |
| Analysis Batch: 660-91136 | Date Analyzed: 02/25/2010 1200 | | | | | | |
| Total Suspended Solids | 11 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2540D |
| Analysis Batch: 660-91018 | Date Analyzed: 02/24/2010 0847 | | | | | | |
| Sulfide | 1.0 | U | mg/L | 1.0 | 1.0 | 1.0 | SM 4500 S2 F |
| Analysis Batch: 660-90921 | Date Analyzed: 02/20/2010 1400 | | | | | | |
| Biochemical Oxygen Demand | 4.20 | | mg/L | 2.00 | 2.00 | 1.0 | SM 5210B |
| Analysis Batch: 660-91308 | Date Analyzed: 02/24/2010 0835 | | | | | | |

# Analytical Data

Client: Environmental Engineering Consultant | Job Number: 660-33914-1

## General Chemistry

**Client Sample ID:** **7B**

Lab Sample ID: 660-33914-6
Client Matrix: Water

Date Sampled: 02/17/2010 1430
Date Received: 02/19/2010 0850

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Nitrite as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| | Analysis Batch: 660-90874 | Date Analyzed: 02/19/2010 0955 | | | | | |
| Nitrate as N | 0.10 | U | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| | Analysis Batch: 660-90874 | Date Analyzed: 02/19/2010 0955 | | | | | |
| Phosphorus, Total | 0.10 | U | mg/L | 0.10 | 0.30 | 1.0 | 365.4 |
| | Analysis Batch: 660-91349 | Date Analyzed: 03/03/2010 1113 | | | | | |
| | Prep Batch: 660-91250 | Date Prepared: 03/01/2010 1700 | | | | | |
| Sulfate | 140 | | mg/L | 10 | 25 | 5.0 | SM 426C |
| | Analysis Batch: 660-91434 | Date Analyzed: 03/04/2010 1100 | | | | | |
| Chloride | 1000 | | mg/L | 60 | 100 | 20 | SM 4500 Cl- E |
| | Analysis Batch: 660-91210 | Date Analyzed: 02/27/2010 0946 | | | | | |
| Chemical Oxygen Demand | 48 | | mg/L | 10 | 20 | 1.0 | SM 5220D |
| | Analysis Batch: 660-91052 | Date Analyzed: 02/24/2010 1413 | | | | | |
| | Prep Batch: 660-91051 | Date Prepared: 02/24/2010 1113 | | | | | |
| Tannins and Lignins | 1.5 | | mg/L | 0.037 | 0.10 | 1.0 | SM 5550B |
| | Analysis Batch: 680-161926 | Date Analyzed: 02/26/2010 1749 | | | | | |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Turbidity | 2.7 | | NTU | 0.10 | 0.10 | 1.0 | 180.1 |
| | Analysis Batch: 660-90881 | Date Analyzed: 02/19/2010 1030 | | | | | |
| Chlorophyll a | 24.2 | | ug/L | 2.00 | 2.00 | 1.0 | SM 10200H |
| | Analysis Batch: 660-91277 | Date Analyzed: 02/25/2010 0933 | | | | | |
| Alkalinity | 440 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2320B |
| | Analysis Batch: 660-91047 | Date Analyzed: 02/24/2010 1336 | | | | | |
| Salinity | 2.5 | | ppt | 2.0 | 2.0 | 1.0 | SM 2520B |
| | Analysis Batch: 660-91136 | Date Analyzed: 02/25/2010 1200 | | | | | |
| Total Suspended Solids | 9.6 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2540D |
| | Analysis Batch: 660-91018 | Date Analyzed: 02/24/2010 0847 | | | | | |
| Sulfide | 1.0 | U | mg/L | 1.0 | 1.0 | 1.0 | SM 4500 S2 F |
| | Analysis Batch: 660-90921 | Date Analyzed: 02/20/2010 1400 | | | | | |
| Biochemical Oxygen Demand | 3.93 | | mg/L | 2.00 | 2.00 | 1.0 | SM 5210B |
| | Analysis Batch: 660-91308 | Date Analyzed: 02/24/2010 0835 | | | | | |

### General Chemistry

**Client Sample ID:** **Surface Water Blank**

Lab Sample ID: 660-33914-7

Client Matrix: Water

Date Sampled: 02/17/2010 0900

Date Received: 02/19/2010 0850

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Ammonia (as N) | 0.072 | | mg/L | 0.010 | 0.020 | 1.0 | 350.1 |
| | Analysis Batch: 660-91786 | Date Analyzed: 03/15/2010 1132 | | | | | |
| Nitrite as N | 0.10 | U Q | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| | Analysis Batch: 660-90874 | Date Analyzed: 02/19/2010 0955 | | | | | |
| Nitrate as N | 3.3 | Q | mg/L | 0.10 | 0.50 | 1.0 | 353.2 |
| | Analysis Batch: 660-90874 | Date Analyzed: 02/19/2010 0955 | | | | | |
| Phosphorus, Total | 0.10 | U | mg/L | 0.10 | 0.30 | 1.0 | 365.4 |
| | Analysis Batch: 660-91349 | Date Analyzed: 03/03/2010 1113 | | | | | |
| | Prep Batch: 660-91250 | Date Prepared: 03/01/2010 1700 | | | | | |
| Sulfate | 2.0 | U | mg/L | 2.0 | 5.0 | 1.0 | SM 426C |
| | Analysis Batch: 660-91434 | Date Analyzed: 03/04/2010 1100 | | | | | |
| Chloride | 12 | | mg/L | 3.0 | 5.0 | 1.0 | SM 4500 Cl- E |
| | Analysis Batch: 660-91210 | Date Analyzed: 02/27/2010 0946 | | | | | |
| Chemical Oxygen Demand | 10 | U | mg/L | 10 | 20 | 1.0 | SM 5220D |
| | Analysis Batch: 660-91052 | Date Analyzed: 02/24/2010 1413 | | | | | |
| | Prep Batch: 660-91051 | Date Prepared: 02/24/2010 1113 | | | | | |
| Tannins and Lignins | 0.037 | U | mg/L | 0.037 | 0.10 | 1.0 | SM 5550B |
| | Analysis Batch: 680-161926 | Date Analyzed: 02/26/2010 1749 | | | | | |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Turbidity | 0.10 | U Q | NTU | 0.10 | 0.10 | 1.0 | 180.1 |
| | Analysis Batch: 660-90881 | Date Analyzed: 02/19/2010 1030 | | | | | |
| Chlorophyll a | 2.00 | Q,U | ug/L | 2.00 | 2.00 | 1.0 | SM 10200H |
| | Analysis Batch: 660-91277 | Date Analyzed: 02/25/2010 0934 | | | | | |
| Alkalinity | 33 | | mg/L | 1.0 | 1.0 | 1.0 | SM 2320B |
| | Analysis Batch: 660-91047 | Date Analyzed: 02/24/2010 1342 | | | | | |
| Salinity | 2.0 | U | ppt | 2.0 | 2.0 | 1.0 | SM 2520B |
| | Analysis Batch: 660-91136 | Date Analyzed: 02/25/2010 1200 | | | | | |
| Total Suspended Solids | 1.0 | U | mg/L | 1.0 | 1.0 | 1.0 | SM 2540D |
| | Analysis Batch: 660-91018 | Date Analyzed: 02/24/2010 0847 | | | | | |
| Sulfide | 1.0 | U | mg/L | 1.0 | 1.0 | 1.0 | SM 4500 S2 F |
| | Analysis Batch: 660-90921 | Date Analyzed: 02/20/2010 1400 | | | | | |
| Biochemical Oxygen Demand | 2.00 | Q,U | mg/L | 2.00 | 2.00 | 1.0 | SM 5210B |
| | Analysis Batch: 660-91308 | Date Analyzed: 02/24/2010 0835 | | | | | |

### General Chemistry

**Client Sample ID:** **4F**

Lab Sample ID: 660-33914-8
Client Matrix: Solid

Date Sampled: 02/17/2010 0940
Date Received: 02/19/2010 0850

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Ammonia (as N) | 9.3 | | mg/Kg | 0.26 | 0.60 | 2.0 | 350.1 |
| | Analysis Batch: 680-161811 | | Date Analyzed: 02/26/2010 1148 | | | | DryWt Corrected: N |
| | Prep Batch: 680-161659 | | Date Prepared: 02/25/2010 1234 | | | | |
| Nitrite as N-Soluble | 1.0 | U | mg/Kg | 1.0 | 5.0 | 1.0 | 353.2 |
| | Analysis Batch: 660-91352 | | Date Analyzed: 03/03/2010 0939 | | | | DryWt Corrected: N |
| Nitrate as N-Soluble | 1.0 | U | mg/Kg | 1.0 | 5.0 | 1.0 | 353.2 |
| | Analysis Batch: 660-91352 | | Date Analyzed: 03/03/2010 0939 | | | | DryWt Corrected: N |
| Phosphorus | 1300 | | mg/Kg | 22 | 40 | 2.0 | 365.4 |
| | Analysis Batch: 680-161565 | | Date Analyzed: 02/24/2010 1446 | | | | DryWt Corrected: N |
| | Prep Batch: 680-161349 | | Date Prepared: 02/22/2010 1258 | | | | |
| Total Organic Carbon | 22000 | | mg/Kg | 1000 | 3000 | 1.0 | 9060 |
| | Analysis Batch: 680-161519 | | Date Analyzed: 02/23/2010 1035 | | | | DryWt Corrected: N |
| Orthophosphate-Soluble | 3.1 | | mg/L | 0.75 | 3.0 | 1.0 | SM 4500 P E |
| | Analysis Batch: 660-91342 | | Date Analyzed: 03/02/2010 1600 | | | | DryWt Corrected: N |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Sulfide | 240 | | mg/Kg | 25 | 25 | 1.0 | 9034 |
| | Analysis Batch: 680-161436 | | Date Analyzed: 02/23/2010 1430 | | | | DryWt Corrected: N |
| | Prep Batch: 680-161395 | | Date Prepared: 02/23/2010 0904 | | | | |
| Sulfate-Soluble | 620 | | mg/Kg | 97 | 97 | 1.0 | 9038 |
| | Analysis Batch: 680-162106 | | Date Analyzed: 03/02/2010 1720 | | | | DryWt Corrected: N |
| pH-Soluble | 7.50 | Q | SU | 1.00 | 1.00 | 1.0 | 9045C |
| | Analysis Batch: 660-91134 | | Date Analyzed: 02/20/2010 1000 | | | | DryWt Corrected: N |
| Percent Solids | 68 | | % | 0.10 | 0.10 | 1.0 | Moisture |
| | Analysis Batch: 660-90884 | | Date Analyzed: 02/19/2010 1236 | | | | DryWt Corrected: N |

### General Chemistry

**Client Sample ID:** **4E**

Lab Sample ID: 660-33914-9
Client Matrix: Solid

Date Sampled: 02/17/2010 1040
Date Received: 02/19/2010 0850

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Ammonia (as N) | 30 | | mg/Kg | 0.65 | 1.5 | 5.0 | 350.1 |
| | Analysis Batch: 680-161811 | Date Analyzed: 02/26/2010 1159 | | | | | DryWt Corrected: N |
| | Prep Batch: 680-161659 | Date Prepared: 02/25/2010 1234 | | | | | |
| Nitrite as N-Soluble | 1.0 | U | mg/Kg | 1.0 | 5.0 | 1.0 | 353.2 |
| | Analysis Batch: 660-91352 | Date Analyzed: 03/03/2010 0939 | | | | | DryWt Corrected: N |
| Nitrate as N-Soluble | 1.4 | I | mg/Kg | 1.0 | 5.0 | 1.0 | 353.2 |
| | Analysis Batch: 660-91352 | Date Analyzed: 03/03/2010 0939 | | | | | DryWt Corrected: N |
| Phosphorus | 630 | | mg/Kg | 9.9 | 18 | 1.0 | 365.4 |
| | Analysis Batch: 680-161565 | Date Analyzed: 02/24/2010 1410 | | | | | DryWt Corrected: N |
| | Prep Batch: 680-161349 | Date Prepared: 02/22/2010 1258 | | | | | |
| Total Organic Carbon | 31000 | | mg/Kg | 1000 | 3000 | 1.0 | 9060 |
| | Analysis Batch: 680-161519 | Date Analyzed: 02/23/2010 1035 | | | | | DryWt Corrected: N |
| Orthophosphate-Soluble | 2.6 | I | mg/L | 0.75 | 3.0 | 1.0 | SM 4500 P E |
| | Analysis Batch: 660-91342 | Date Analyzed: 03/02/2010 1600 | | | | | DryWt Corrected: N |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Sulfide | 30 | | mg/Kg | 25 | 25 | 1.0 | 9034 |
| | Analysis Batch: 680-161436 | Date Analyzed: 02/23/2010 1430 | | | | | DryWt Corrected: N |
| | Prep Batch: 680-161395 | Date Prepared: 02/23/2010 0904 | | | | | |
| Sulfate-Soluble | 99 | U | mg/Kg | 99 | 99 | 1.0 | 9038 |
| | Analysis Batch: 680-162106 | Date Analyzed: 03/02/2010 1720 | | | | | DryWt Corrected: N |
| pH-Soluble | 7.73 | Q | SU | 1.00 | 1.00 | 1.0 | 9045C |
| | Analysis Batch: 660-91134 | Date Analyzed: 02/20/2010 1000 | | | | | DryWt Corrected: N |
| Percent Solids | 49 | | % | 0.10 | 0.10 | 1.0 | Moisture |
| | Analysis Batch: 660-90884 | Date Analyzed: 02/19/2010 1243 | | | | | DryWt Corrected: N |

## General Chemistry

**Client Sample ID:** **10**

Lab Sample ID: 660-33914-10
Client Matrix: Solid

Date Sampled: 02/17/2010 1250
Date Received: 02/19/2010 0850

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Ammonia (as N) | 35 | | mg/Kg | 0.65 | 1.5 | 5.0 | 350.1 |
| Analysis Batch: 680-161811 | Date Analyzed: 02/26/2010 1206 | | | | | | DryWt Corrected: N |
| Prep Batch: 680-161659 | Date Prepared: 02/25/2010 1234 | | | | | | |
| Nitrite as N-Soluble | 1.0 | U | mg/Kg | 1.0 | 5.0 | 1.0 | 353.2 |
| Analysis Batch: 660-91352 | Date Analyzed: 03/03/2010 0939 | | | | | | DryWt Corrected: N |
| Nitrate as N-Soluble | 1.0 | U | mg/Kg | 1.0 | 5.0 | 1.0 | 353.2 |
| Analysis Batch: 660-91352 | Date Analyzed: 03/03/2010 0939 | | | | | | DryWt Corrected: N |
| Phosphorus | 220 | | mg/Kg | 9.4 | 17 | 1.0 | 365.4 |
| Analysis Batch: 680-161565 | Date Analyzed: 02/24/2010 1417 | | | | | | DryWt Corrected: N |
| Prep Batch: 680-161349 | Date Prepared: 02/22/2010 1258 | | | | | | |
| Total Organic Carbon | 140000 | | mg/Kg | 1000 | 3000 | 1.0 | 9060 |
| Analysis Batch: 680-161519 | Date Analyzed: 02/23/2010 1035 | | | | | | DryWt Corrected: N |
| Orthophosphate-Soluble | 3.9 | | mg/L | 0.75 | 3.0 | 1.0 | SM 4500 P E |
| Analysis Batch: 660-91342 | Date Analyzed: 03/02/2010 1600 | | | | | | DryWt Corrected: N |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Sulfide | 25 | U | mg/Kg | 25 | 25 | 1.0 | 9034 |
| Analysis Batch: 680-161436 | Date Analyzed: 02/23/2010 1430 | | | | | | DryWt Corrected: N |
| Prep Batch: 680-161395 | Date Prepared: 02/23/2010 0904 | | | | | | |
| Sulfate-Soluble | 100 | U | mg/Kg | 100 | 100 | 1.0 | 9038 |
| Analysis Batch: 680-162106 | Date Analyzed: 03/02/2010 1720 | | | | | | DryWt Corrected: N |
| pH-Soluble | 7.45 | Q | SU | 1.00 | 1.00 | 1.0 | 9045C |
| Analysis Batch: 660-91134 | Date Analyzed: 02/20/2010 1000 | | | | | | DryWt Corrected: N |
| Percent Solids | 9.8 | | % | 0.10 | 0.10 | 1.0 | Moisture |
| Analysis Batch: 660-90884 | Date Analyzed: 02/19/2010 1309 | | | | | | DryWt Corrected: N |

### General Chemistry

**Client Sample ID:** **7A**

Lab Sample ID: 660-33914-11
Client Matrix: Solid

Date Sampled: 02/17/2010 1400
Date Received: 02/19/2010 0850

| Analyte | Result | Qual | Units | MDL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Ammonia (as N) | 8.8 | | mg/Kg | 0.13 | 0.30 | 1.0 | 350.1 |
| | Analysis Batch: 680-161811 | Date Analyzed: 02/26/2010 1120 | | | | | DryWt Corrected: N |
| | Prep Batch: 680-161659 | Date Prepared: 02/25/2010 1234 | | | | | |
| Nitrite as N-Soluble | 1.0 | U | mg/Kg | 1.0 | 5.0 | 1.0 | 353.2 |
| | Analysis Batch: 660-91352 | Date Analyzed: 03/03/2010 0939 | | | | | DryWt Corrected: N |
| Nitrate as N-Soluble | 1.0 | U | mg/Kg | 1.0 | 5.0 | 1.0 | 353.2 |
| | Analysis Batch: 660-91352 | Date Analyzed: 03/03/2010 0939 | | | | | DryWt Corrected: N |
| Phosphorus | 270 | | mg/Kg | 8.9 | 16 | 1.0 | 365.4 |
| | Analysis Batch: 680-161565 | Date Analyzed: 02/24/2010 1417 | | | | | DryWt Corrected: N |
| | Prep Batch: 680-161349 | Date Prepared: 02/22/2010 1258 | | | | | |
| Total Organic Carbon | 30000 | | mg/Kg | 1000 | 3000 | 1.0 | 9060 |
| | Analysis Batch: 680-161519 | Date Analyzed: 02/23/2010 1035 | | | | | DryWt Corrected: N |
| Orthophosphate-Soluble | 0.91 | I | mg/L | 0.75 | 3.0 | 1.0 | SM 4500 P E |
| | Analysis Batch: 660-91342 | Date Analyzed: 03/02/2010 1600 | | | | | DryWt Corrected: N |

| Analyte | Result | Qual | Units | PQL | PQL | Dil | Method |
|---|---|---|---|---|---|---|---|
| Sulfide | 25 | U | mg/Kg | 25 | 25 | 1.0 | 9034 |
| | Analysis Batch: 680-161436 | Date Analyzed: 02/23/2010 1430 | | | | | DryWt Corrected: N |
| | Prep Batch: 680-161395 | Date Prepared: 02/23/2010 0904 | | | | | |
| Sulfate-Soluble | 96 | U | mg/Kg | 96 | 96 | 1.0 | 9038 |
| | Analysis Batch: 680-162106 | Date Analyzed: 03/02/2010 1726 | | | | | DryWt Corrected: N |
| pH-Soluble | 7.51 | Q | SU | 1.00 | 1.00 | 1.0 | 9045C |
| | Analysis Batch: 660-91134 | Date Analyzed: 02/20/2010 1000 | | | | | DryWt Corrected: N |
| Percent Solids | 41 | | % | 0.10 | 0.10 | 1.0 | Moisture |
| | Analysis Batch: 660-90884 | Date Analyzed: 02/19/2010 1304 | | | | | DryWt Corrected: N |

# DATA REPORTING QUALIFIERS

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

| Lab Section | Qualifier | Description |
|---|---|---|
| GC VOA | | |
| | V | Indicates the analyte was detected in both the sample and the associated method blank. |
| | I | The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit. |
| GC Semi VOA | | |
| | J3 | Estimated value; value may not be accurate. Spike recovery or RPD outside of criteria. |
| | J1 | Estimated value; value may not be accurate. Surrogate recovery outside of criteria. |
| | U | Indicates that the compound was analyzed for but not detected. |
| | I | The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit. |
| Metals | | |
| | J3 | Estimated value; value may not be accurate. Spike recovery or RPD outside of criteria. |
| | U | Indicates that the compound was analyzed for but not detected. |
| | I | The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit. |
| General Chemistry | | |
| | J3 | Estimated value; value may not be accurate. Spike recovery or RPD outside of criteria. |
| | U | Indicates that the compound was analyzed for but not detected. |
| | Q | Sample held beyond the accepted holding time. |
| | I | The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit. |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Method Blank - Batch: 400-104240**

**Method: RSK-175**
**Preparation: N/A**

Lab Sample ID: MB 400-104240/1
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/23/2010 1943
Date Prepared: N/A

Analysis Batch: 400-104240
Prep Batch: N/A
Units: ug/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL
Injection Volume:

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Carbon dioxide (as CO2) | 10.0 | I | 7.0 | 50 |

**Lab Control Sample/**
**Lab Control Sample Duplicate Recovery Report - Batch: 400-104240**

**Method: RSK-175**
**Preparation: N/A**

LCS Lab Sample ID: LCS 400-104240/2
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/23/2010 1917
Date Prepared: N/A

Analysis Batch: 400-104240
Prep Batch: N/A
Units: ug/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL
Injection Volume:

LCSD Lab Sample ID: LCSD 400-104240/3
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/23/2010 1931
Date Prepared: N/A

Analysis Batch: 400-104240
Prep Batch: N/A
Units: ug/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL
Injection Volume:

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | LCS | LCSD | Limit | RPD | RPD Limit | LCS Qual | LCSD Qual |
| Carbon dioxide (as CO2) | 107 | 106 | 80 - 120 | 1 | 50 | | |

**Method Blank - Batch: 660-90901**

**Method: 8081A**
**Preparation: 3550B**

| | | | |
|---|---|---|---|
| Lab Sample ID: MB 660-90901/1-A | Analysis Batch: 660-91299 | Instrument ID: BSGJ | |
| Client Matrix: Solid | Prep Batch: 660-90901 | Lab File ID: 1B24J035.D | |
| Dilution: 1.0 | Units: ug/Kg | Initial Weight/Volume: 30.00 g | |
| Date Analyzed: 02/25/2010 0349 | | Final Weight/Volume: 10 mL | |
| Date Prepared: 02/22/2010 0654 | | Injection Volume: 2 uL | |
| | | Column ID: PRIMARY | |

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| 4,4'-DDD | 0.50 | U | 0.50 | 3.3 |
| 4,4'-DDE | 0.50 | U | 0.50 | 3.3 |
| 4,4'-DDT | 0.50 | U | 0.50 | 3.3 |
| Aldrin | 0.50 | U | 0.50 | 2.0 |
| alpha-BHC | 0.14 | U | 0.14 | 1.7 |
| beta-BHC | 0.50 | U | 0.50 | 2.0 |
| Chlordane (technical) | 2.4 | U | 2.4 | 17 |
| delta-BHC | 0.50 | U | 0.50 | 2.0 |
| Dieldrin | 0.15 | U | 0.15 | 1.7 |
| Endosulfan I | 0.25 | U | 0.25 | 2.0 |
| Endosulfan II | 0.25 | U | 0.25 | 3.3 |
| Endosulfan sulfate | 0.25 | U | 0.25 | 3.3 |
| Endrin | 0.50 | U | 0.50 | 4.0 |
| Endrin aldehyde | 0.50 | U | 0.50 | 4.0 |
| Endrin ketone | 0.50 | U | 0.50 | 4.0 |
| gamma-BHC (Lindane) | 0.50 | U | 0.50 | 2.0 |
| Heptachlor | 0.50 | U | 0.50 | 2.0 |
| Heptachlor epoxide | 0.14 | U | 0.14 | 2.0 |
| Methoxychlor | 1.0 | U | 1.0 | 17 |
| Toxaphene | 29 | U | 29 | 170 |

| Surrogate | % Rec | Acceptance Limits |
|---|---|---|
| DCB Decachlorobiphenyl | 81 | 30 - 150 |
| Tetrachloro-m-xylene | 82 | 30 - 150 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Lab Control Sample - Batch: 660-90901**

**Method: 8081A**
**Preparation: 3550B**

Lab Sample ID: LCS 660-90901/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/25/2010 0403
Date Prepared: 02/22/2010 0654

Analysis Batch: 660-91299
Prep Batch: 660-90901
Units: ug/Kg

Instrument ID: BSGJ
Lab File ID: 1B24J036.D
Initial Weight/Volume: 30.00 g
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Column ID: PRIMARY

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| 4,4'-DDD | 16.7 | 15.1 | 91 | 62 - 130 | |
| 4,4'-DDE | 16.7 | 14.5 | 87 | 60 - 130 | |
| 4,4'-DDT | 16.7 | 15.2 | 91 | 35 - 142 | |
| Aldrin | 16.7 | 14.7 | 88 | 52 - 130 | |
| alpha-BHC | 16.7 | 14.8 | 89 | 58 - 130 | |
| beta-BHC | 16.7 | 14.9 | 89 | 56 - 130 | |
| delta-BHC | 16.7 | 15.8 | 95 | 48 - 130 | |
| Dieldrin | 16.7 | 14.3 | 86 | 60 - 130 | |
| Endosulfan I | 16.7 | 13.9 | 83 | 59 - 130 | |
| Endosulfan II | 16.7 | 14.2 | 85 | 60 - 130 | |
| Endosulfan sulfate | 16.7 | 15.5 | 93 | 49 - 130 | |
| Endrin | 16.7 | 14.5 | 87 | 57 - 130 | |
| Endrin aldehyde | 16.7 | 14.6 | 88 | 57 - 130 | |
| Endrin ketone | 16.7 | 16.4 | 98 | 42 - 136 | |
| gamma-BHC (Lindane) | 16.7 | 15.0 | 90 | 58 - 130 | |
| Heptachlor | 16.7 | 15.4 | 92 | 55 - 130 | |
| Heptachlor epoxide | 16.7 | 14.4 | 87 | 59 - 130 | |
| Methoxychlor | 16.7 | 16.4 | 98 | 37 - 133 | I |

| Surrogate | % Rec | Acceptance Limits |
|---|---|---|
| DCB Decachlorobiphenyl | 83 | 30 - 150 |

**Matrix Spike/**
**Matrix Spike Duplicate Recovery Report - Batch: 660-90901**

**Method: 8081A**
**Preparation: 3550B**

| | | | | | |
|---|---|---|---|---|---|
| MS Lab Sample ID: | 660-33914-11 | Analysis Batch: | 660-91299 | Instrument ID: | BSGJ |
| Client Matrix: | Solid | Prep Batch: | 660-90901 | Lab File ID: | 1B24J049.D |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 30.20 g |
| Date Analyzed: | 02/25/2010 0657 | | | Final Weight/Volume: | 10 mL |
| Date Prepared: | 02/22/2010 0654 | | | Injection Volume: | 2 uL |
| | | | | Column ID: | PRIMARY |

| | | | | | |
|---|---|---|---|---|---|
| MSD Lab Sample ID: | 660-33914-11 | Analysis Batch: | 660-91299 | Instrument ID: | BSGJ |
| Client Matrix: | Solid | Prep Batch: | 660-90901 | Lab File ID: | 1B24J050.D |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 30.20 g |
| Date Analyzed: | 02/25/2010 0710 | | | Final Weight/Volume: | 10 mL |
| Date Prepared: | 02/22/2010 0654 | | | Injection Volume: | 2 uL |
| | | | | Column ID: | PRIMARY |

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| 4,4'-DDD | 69 | 75 | 62 - 130 | 9 | 50 | | |
| 4,4'-DDE | 58 | 62 | 60 - 130 | 6 | 25 | J3 | |
| 4,4'-DDT | 4 | 4 | 35 - 142 | 0 | 26 | J3 | J3 |
| Aldrin | 58 | 64 | 52 - 130 | 9 | 38 | | |
| alpha-BHC | 70 | 73 | 58 - 130 | 3 | 40 | | |
| beta-BHC | 57 | 72 | 56 - 130 | 23 | 40 | | |
| delta-BHC | 81 | 90 | 48 - 130 | 10 | 47 | | |
| Dieldrin | 70 | 72 | 60 - 130 | 2 | 30 | | |
| Endosulfan I | 62 | 63 | 59 - 130 | 2 | 40 | | |
| Endosulfan II | 52 | 55 | 60 - 130 | 5 | 65 | J3 | J3 |
| Endosulfan sulfate | 52 | 55 | 49 - 130 | 6 | 50 | | |
| Endrin | 28 | 31 | 57 - 130 | 11 | 32 | J3 | J3 |
| Endrin aldehyde | 56 | 57 | 57 - 130 | 3 | 86 | J3 | |
| Endrin ketone | 17 | 19 | 42 - 136 | 15 | 31 | J3 | J3 |
| gamma-BHC (Lindane) | 45 | 53 | 58 - 130 | 16 | 37 | J3 | J3 |
| Heptachlor | 34 | 51 | 55 - 130 | 42 | 38 | J3 | J3 |
| Heptachlor epoxide | 57 | 58 | 59 - 130 | 2 | 40 | J3 | J3 |
| Methoxychlor | 0 | 7 | 37 - 133 | NC | 40 | J3 | J3 |

| Surrogate | MS % Rec | MSD % Rec | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 43 | 50 | 30 - 150 |

**Method Blank - Batch: 660-90902**

**Method: 8081A**
**Preparation: 3510C**

Lab Sample ID: MB 660-90902/1-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/23/2010 1225
Date Prepared: 02/22/2010 0737

Analysis Batch: 660-91104
Prep Batch: 660-90902
Units: ug/L

Instrument ID: BSGJ
Lab File ID: 1B23J016.D
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Column ID: PRIMARY

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| 4,4'-DDD | 0.0041 | U | 0.0041 | 0.010 |
| 4,4'-DDE | 0.0055 | U | 0.0055 | 0.010 |
| 4,4'-DDT | 0.0032 | U | 0.0032 | 0.010 |
| Aldrin | 0.0018 | U | 0.0018 | 0.010 |
| alpha-BHC | 0.0028 | U | 0.0028 | 0.010 |
| beta-BHC | 0.0027 | U | 0.0027 | 0.010 |
| Chlordane (technical) | 0.057 | U | 0.057 | 0.50 |
| delta-BHC | 0.0028 | U | 0.0028 | 0.010 |
| Dieldrin | 0.0014 | U | 0.0014 | 0.010 |
| Endosulfan I | 0.0034 | U | 0.0034 | 0.010 |
| Endosulfan II | 0.0033 | U | 0.0033 | 0.010 |
| Endosulfan sulfate | 0.0030 | U | 0.0030 | 0.010 |
| Endrin | 0.0031 | U | 0.0031 | 0.010 |
| Endrin aldehyde | 0.0032 | U | 0.0032 | 0.010 |
| Endrin ketone | 0.0054 | U | 0.0054 | 0.10 |
| gamma-BHC (Lindane) | 0.0026 | U | 0.0026 | 0.010 |
| Heptachlor | 0.0031 | U | 0.0031 | 0.010 |
| Heptachlor epoxide | 0.0031 | U | 0.0031 | 0.010 |
| Methoxychlor | 0.0051 | U | 0.0051 | 0.010 |
| Toxaphene | 0.72 | U | 0.72 | 3.0 |

| Surrogate | % Rec | Acceptance Limits |
|---|---|---|
| DCB Decachlorobiphenyl | 73 | 30 - 150 |
| Tetrachloro-m-xylene | 58 | 30 - 150 |

## Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Lab Control Sample - Batch: 660-90902**

**Method: 8081A**
**Preparation: 3510C**

Lab Sample ID: LCS 660-90902/2-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/23/2010 1238
Date Prepared: 02/22/2010 0737

Analysis Batch: 660-91104
Prep Batch: 660-90902
Units: ug/L

Instrument ID: BSGJ
Lab File ID: 1B23J017.D
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Column ID: PRIMARY

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| 4,4'-DDD | 0.500 | 0.407 | 81 | 37 - 139 | |
| 4,4'-DDE | 0.500 | 0.407 | 81 | 39 - 130 | |
| 4,4'-DDT | 0.500 | 0.400 | 80 | 46 - 130 | |
| Aldrin | 0.500 | 0.332 | 66 | 31 - 130 | |
| alpha-BHC | 0.500 | 0.396 | 79 | 48 - 130 | |
| beta-BHC | 0.500 | 0.401 | 80 | 41 - 130 | |
| delta-BHC | 0.500 | 0.338 | 68 | 42 - 130 | |
| Dieldrin | 0.500 | 0.391 | 78 | 51 - 130 | |
| Endosulfan I | 0.500 | 0.383 | 77 | 40 - 130 | |
| Endosulfan II | 0.500 | 0.387 | 77 | 41 - 130 | |
| Endosulfan sulfate | 0.500 | 0.377 | 75 | 33 - 142 | |
| Endrin | 0.500 | 0.376 | 75 | 49 - 130 | |
| Endrin aldehyde | 0.500 | 0.367 | 73 | 34 - 132 | |
| Endrin ketone | 0.500 | 0.401 | 80 | 26 - 144 | |
| gamma-BHC (Lindane) | 0.500 | 0.390 | 78 | 53 - 130 | |
| Heptachlor | 0.500 | 0.349 | 70 | 36 - 130 | |
| Heptachlor epoxide | 0.500 | 0.381 | 76 | 41 - 130 | |
| Methoxychlor | 0.500 | 0.397 | 79 | 45 - 130 | |

| Surrogate | % Rec | Acceptance Limits |
|---|---|---|
| DCB Decachlorobiphenyl | 74 | 30 - 150 |

## Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Matrix Spike/**
**Matrix Spike Duplicate Recovery Report - Batch: 660-90902**

**Method: 8081A**
**Preparation: 3510C**

MS Lab Sample ID: 660-33904-A-2-B MS
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/23/2010 1318
Date Prepared: 02/22/2010 0737

Analysis Batch: 660-91104
Prep Batch: 660-90902

Instrument ID: BSGJ
Lab File ID: 1B23J020.D
Initial Weight/Volume: 1040 mL
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Column ID: PRIMARY

MSD Lab Sample ID: 660-33904-A-2-C MSD
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/23/2010 1332
Date Prepared: 02/22/2010 0737

Analysis Batch: 660-91104
Prep Batch: 660-90902

Instrument ID: BSGJ
Lab File ID: 1B23J021.D
Initial Weight/Volume: 1040 mL
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Column ID: PRIMARY

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| 4,4'-DDD | 88 | 82 | 37 - 139 | 7 | 39 | | |
| 4,4'-DDE | 82 | 77 | 39 - 130 | 6 | 18 | | |
| 4,4'-DDT | 236 | 218 | 46 - 130 | 8 | 27 | J3 | J3 |
| Aldrin | 63 | 58 | 31 - 130 | 8 | 25 | | |
| alpha-BHC | 77 | 70 | 48 - 130 | 7 | 30 | | |
| beta-BHC | 77 | 71 | 41 - 130 | 6 | 35 | | |
| delta-BHC | 69 | 65 | 42 - 130 | 5 | 41 | | |
| Dieldrin | 77 | 72 | 51 - 130 | 7 | 42 | | |
| Endosulfan I | 73 | 68 | 40 - 130 | 8 | 24 | | |
| Endosulfan II | 76 | 71 | 41 - 130 | 7 | 22 | | |
| Endosulfan sulfate | 72 | 68 | 33 - 142 | 5 | 28 | | |
| Endrin | 108 | 102 | 49 - 130 | 6 | 25 | | |
| Endrin aldehyde | 69 | 64 | 34 - 132 | 8 | 34 | | |
| Endrin ketone | 78 | 74 | 26 - 144 | 5 | 25 | | |
| gamma-BHC (Lindane) | 72 | 67 | 53 - 130 | 7 | 26 | | |
| Heptachlor | 69 | 65 | 36 - 130 | 6 | 26 | | |
| Heptachlor epoxide | 70 | 64 | 41 - 130 | 7 | 31 | | |
| Methoxychlor | 101 | 89 | 45 - 130 | 12 | 43 | | |

| Surrogate | MS % Rec | MSD % Rec | Acceptance Limits |
|---|---|---|---|
| DCB Decachlorobiphenyl | 54 | 50 | 30 - 150 |

# Quality Control Results

Client: Environmental Engineering Consultant | Job Number: 660-33914-1

**Method Blank - Batch: 640-65855**

**Method: 8141A**
**Preparation: 3550B**

Lab Sample ID: MB 640-65855/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/24/2010 0831
Date Prepared: 02/22/2010 1006

Analysis Batch: 640-65935
Prep Batch: 640-65855
Units: ug/Kg

Instrument ID: SGF
Lab File ID: 1B23F63.d
Initial Weight/Volume: 00030.24 g
Final Weight/Volume: 10.0 mL
Injection Volume: 1 uL
Column ID: PRIMARY

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Azinphos-methyl | 4.4 | U | 4.4 | 65 |
| Bolstar | 8.4 | U | 8.4 | 33 |
| Chlorpyrifos | 8.3 | U | 8.3 | 33 |
| Coumaphos | 8.5 | U | 8.5 | 330 |
| Demeton, Total | 13 | U | 13 | 82 |
| Diazinon | 8.7 | U | 8.7 | 33 |
| Dichlorvos | 17 | U | 17 | 65 |
| Dimethoate | 9.9 | U | 9.9 | 65 |
| Disulfoton | 11 | U | 11 | 65 |
| EPN | 9.0 | U | 9.0 | 33 |
| Ethoprop | 15 | U | 15 | 17 |
| Fensulfothion | 9.9 | U | 9.9 | 330 |
| Hexazinone | 7.6 | U | 7.6 | 33 |
| Hexazinone | 7.6 | U | 7.6 | 33 |
| Malathion | 8.9 | U | 8.9 | 33 |
| Merphos | 8.2 | U | 8.2 | 33 |
| Mevinphos | 11 | U | 11 | 65 |
| Ethyl Parathion | 8.7 | U | 8.7 | 33 |
| Monochrotophos | 84 | U | 84 | 330 |
| Methyl parathion | 5.4 | U | 5.4 | 17 |
| Naled | 5.2 | U | 5.2 | 330 |
| Phorate | 11 | U | 11 | 33 |
| Ronnel | 7.9 | U | 7.9 | 33 |
| Stirophos | 8.8 | U | 8.8 | 33 |
| Sulfotepp | 5.3 | U | 5.3 | 17 |
| Tokuthion | 7.6 | U | 7.6 | 33 |
| Trichloronate | 8.1 | U | 8.1 | 330 |

| Surrogate | % Rec | Acceptance Limits |
|---|---|---|
| Triphenylphosphate | 94 | 35 - 134 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

## Lab Control Sample/
## Lab Control Sample Duplicate Recovery Report - Batch: 640-65855

**Method: 8141A**
**Preparation: 3550B**

LCS Lab Sample ID: LCS 640-65855/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/24/2010 1004
Date Prepared: 02/22/2010 1006

Analysis Batch: 640-65935
Prep Batch: 640-65855
Units: ug/Kg

Instrument ID: SGF
Lab File ID: 1B23F69.d
Initial Weight/Volume: 00030.07 g
Final Weight/Volume: 10.0 mL
Injection Volume: 1 uL
Column ID: PRIMARY

LCSD Lab Sample ID: LCSD 640-65855/3-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/24/2010 1018
Date Prepared: 02/22/2010 1006

Analysis Batch: 640-65935
Prep Batch: 640-65855
Units: ug/Kg

Instrument ID: SGF
Lab File ID: 1B23F70.d
Initial Weight/Volume: 00030.36 g
Final Weight/Volume: 10.0 mL
Injection Volume: 1 uL
Column ID: PRIMARY

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | LCS | LCSD | Limit | RPD | RPD Limit | LCS Qual | LCSD Qual |
| Azinphos-methyl | 102 | 105 | 50 - 130 | 2 | 50 | | |
| Bolstar | 74 | 80 | 50 - 130 | 1 | 50 | | |
| Chlorpyrifos | 70 | 76 | 31 - 130 | 7 | 50 | | |
| Coumaphos | 87 | 88 | 50 - 130 | 1 | 50 | I | I |
| Demeton, Total | 65 | 70 | | 7 | | | |
| Diazinon | 68 | 73 | 20 - 100 | 6 | 50 | | |
| Dichlorvos | 76 | 82 | 50 - 130 | 7 | 50 | | |
| EPN | 103 | 109 | 50 - 130 | 4 | 50 | | |
| Ethoprop | 68 | 75 | 50 - 130 | 8 | 50 | | |
| Fensulfothion | 102 | 107 | 50 - 130 | 4 | 50 | I | I |
| Malathion | 72 | 77 | 50 - 130 | 6 | 50 | | |
| Mevinphos | 72 | 78 | 50 - 130 | 4 | 50 | | |
| Ethyl Parathion | 80 | 87 | 22 - 116 | 8 | 50 | | |
| Monochrotophos | 70 | 76 | 50 - 130 | 8 | 50 | | |
| Methyl parathion | 79 | 84 | 20 - 107 | 3 | 50 | | |
| Naled | 53 | 53 | 50 - 130 | 1 | 50 | | |
| Phorate | 66 | 72 | 50 - 130 | 0 | 50 | | |
| Ronnel | 69 | 74 | 38 - 130 | 6 | 50 | | |
| Stirophos | 79 | 85 | 50 - 130 | 2 | 50 | | |
| Tokuthion | 71 | 78 | 50 - 130 | 9 | 50 | | |
| Trichloronate | 68 | 75 | 50 - 130 | 1 | 50 | I | I |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Matrix Spike/**
**Matrix Spike Duplicate Recovery Report - Batch: 640-65855**

**Method: 8141A**
**Preparation: 3550B**

MS Lab Sample ID: 400-45631-C-1-A MS
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/24/2010 0936
Date Prepared: 02/22/2010 1006

Analysis Batch: 640-65935
Prep Batch: 640-65855

Instrument ID: SGF
Lab File ID: 1B23F67.d
Initial Weight/Volume: 00030.26 g
Final Weight/Volume: 10.0 mL
Injection Volume: 1 uL
Column ID: PRIMARY

MSD Lab Sample ID: 400-45631-C-1-B MSD
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/24/2010 0950
Date Prepared: 02/22/2010 1006

Analysis Batch: 640-65935
Prep Batch: 640-65855

Instrument ID: SGF
Lab File ID: 1B23F68.d
Initial Weight/Volume: 00030.25 g
Final Weight/Volume: 10.0 mL
Injection Volume: 1 uL
Column ID: PRIMARY

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Azinphos-methyl | 94 | 61 | 50 - 130 | 42 | 50 | | |
| Bolstar | 74 | 58 | 50 - 130 | 34 | 50 | | |
| Chlorpyrifos | 70 | 55 | 31 - 130 | 23 | 50 | | |
| Coumaphos | 93 | 64 | 50 - 130 | 37 | 50 | I | I |
| Demeton, Total | 52 | 35 | 50 - 130 | 38 | | | J3 |
| Diazinon | 62 | 46 | 20 - 100 | 29 | 50 | | |
| Dichlorvos | 56 | 36 | 50 - 130 | 44 | 50 | | I J3 |
| EPN | 106 | 78 | 50 - 130 | 31 | 50 | | |
| Ethoprop | 57 | 40 | 50 - 130 | 35 | 50 | | J3 |
| Fensulfothion | 58 | 55 | 50 - 130 | 6 | 50 | I | I |
| Malathion | 69 | 46 | 50 - 130 | 40 | 50 | | J3 |
| Mevinphos | 23 | 24 | 50 - 130 | 4 | 50 | I J3 | I J3 |
| Ethyl Parathion | 80 | 56 | 22 - 116 | 35 | 50 | | |
| Monochrotophos | 0 | 0 | 50 - 130 | NC | 50 | U J3 | U J3 |
| Methyl parathion | 72 | 49 | 20 - 107 | 43 | 50 | | |
| Naled | 36 | 20 | 50 - 130 | 63 | 50 | I J3 | I J3 |
| Phorate | 56 | 40 | 50 - 130 | 40 | 50 | | J3 |
| Ronnel | 67 | 51 | 38 - 130 | 26 | 50 | | |
| Stirophos | 76 | 52 | 50 - 130 | 38 | 50 | | |
| Tokuthion | 70 | 58 | 50 - 130 | 18 | 50 | | |
| Trichloronate | 67 | 55 | 50 - 130 | 25 | 50 | I | I |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Method Blank - Batch: 640-65857**

**Method: 8141A**
**Preparation: 3520C**

Lab Sample ID: MB 640-65857/1-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1429
Date Prepared: 02/22/2010 1420

Analysis Batch: 640-65997
Prep Batch: 640-65857
Units: ug/L

Instrument ID: SGF
Lab File ID: 1B25F14.d
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 5.0 mL
Injection Volume: 1 uL
Column ID: PRIMARY

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Hexazinone | 0.16 | U | 0.16 | 2.0 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Method Blank - Batch: 640-65857**

**Method: 8141A**
**Preparation: 3520C**

Lab Sample ID: MB 640-65857/1-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/26/2010 0739
Date Prepared: 02/22/2010 1420

Analysis Batch: 640-66015
Prep Batch: 640-65857
Units: ug/L

Instrument ID: SGF
Lab File ID: 1B25F55.d
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 5.0 mL
Injection Volume: 1 uL
Column ID: PRIMARY

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Azinphos-methyl | 0.33 | U | 0.33 | 1.0 |
| Bolstar | 0.095 | U | 0.095 | 1.0 |
| Chlorpyrifos | 0.11 | U | 0.11 | 1.0 |
| Coumaphos | 0.081 | U | 0.081 | 1.0 |
| Demeton, Total | 0.15 | U | 0.15 | 2.5 |
| Diazinon | 0.11 | U | 0.11 | 1.0 |
| Dichlorvos | 0.26 | U | 0.26 | 2.0 |
| Dimethoate | 0.32 | U | 0.32 | 2.0 |
| Disulfoton | 0.12 | U | 0.12 | 2.0 |
| EPN | 0.071 | U | 0.071 | 1.0 |
| Ethoprop | 0.41 | U | 0.41 | 0.50 |
| Fensulfothion | 0.17 | U | 0.17 | 5.0 |
| Malathion | 0.092 | U | 0.092 | 1.0 |
| Merphos | 0.13 | U | 0.13 | 1.0 |
| Mevinphos | 0.15 | U | 0.15 | 2.0 |
| Ethyl Parathion | 0.080 | U | 0.080 | 1.0 |
| Monochrotophos | 2.6 | U | 2.6 | 10 |
| Methyl parathion | 0.12 | U | 0.12 | 0.50 |
| Naled | 0.36 | U | 0.36 | 5.0 |
| Phorate | 0.16 | U | 0.16 | 1.0 |
| Ronnel | 0.13 | U | 0.13 | 1.0 |
| Stirophos | 0.084 | U | 0.084 | 1.0 |
| Sulfotepp | 0.055 | U | 0.055 | 0.50 |
| Tokuthion | 0.087 | U | 0.087 | 1.0 |
| Trichloronate | 0.11 | U | 0.11 | 1.0 |

| Surrogate | % Rec | Acceptance Limits |
|---|---|---|
| Triphenylphosphate | 102 | 37 - 139 |

## Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Lab Control Sample/**
**Lab Control Sample Duplicate Recovery Report - Batch: 640-65857**

**Method: 8141A**
**Preparation: 3520C**

LCS Lab Sample ID: LCS 640-65857/6-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/26/2010 1015
Date Prepared: 02/22/2010 1420

Analysis Batch: 640-66015
Prep Batch: 640-65857
Units: ug/L

Instrument ID: SGF
Lab File ID: 1B25F66.d
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 5.0 mL
Injection Volume: 1 uL
Column ID: PRIMARY

LCSD Lab Sample ID: LCSD 640-65857/7-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/26/2010 1029
Date Prepared: 02/22/2010 1420

Analysis Batch: 640-66015
Prep Batch: 640-65857
Units: ug/L

Instrument ID: SGF
Lab File ID: 1B25F67.d
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 5.0 mL
Injection Volume: 1 uL
Column ID: PRIMARY

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | LCS | LCSD | Limit | RPD | RPD Limit | LCS Qual | LCSD Qual |
| Azinphos-methyl | 103 | 113 | 50 - 130 | 10 | 30 | | |
| Bolstar | 97 | 98 | 50 - 130 | 1 | 30 | | |
| Chlorpyrifos | 97 | 96 | 50 - 130 | 1 | 30 | | |
| Coumaphos | 111 | 120 | 50 - 130 | 7 | 30 | | |
| Demeton, Total | 77 | 76 | | 1 | | | |
| Diazinon | 104 | 102 | 42 - 132 | 2 | 30 | | |
| Dichlorvos | 112 | 117 | 50 - 130 | 5 | 30 | | |
| EPN | 114 | 123 | 50 - 130 | 7 | 30 | | |
| Ethoprop | 104 | 102 | 50 - 130 | 2 | 30 | | |
| Fensulfothion | 93 | 103 | 50 - 130 | 10 | 30 | I | I |
| Malathion | 105 | 103 | 50 - 130 | 2 | 30 | | |
| Mevinphos | 101 | 104 | 50 - 130 | 3 | 30 | | |
| Ethyl Parathion | 107 | 107 | 49 - 134 | 0 | 30 | | |
| Monochrotophos | 22 | 38 | 50 - 130 | 52 | 30 | U J3 | I J3 |
| Methyl parathion | 103 | 103 | 43 - 140 | 0 | 30 | | |
| Naled | 71 | 70 | 50 - 130 | 0 | 30 | | |
| Phorate | 88 | 94 | 50 - 130 | 7 | 30 | | |
| Ronnel | 89 | 90 | 38 - 124 | 2 | 30 | | |
| Stirophos | 111 | 110 | 50 - 130 | 1 | 30 | | |
| Tokuthion | 96 | 94 | 50 - 130 | 1 | 30 | | |
| Trichloronate | 102 | 102 | 50 - 130 | 0 | 30 | | |

### Matrix Spike/ Matrix Spike Duplicate Recovery Report - Batch: 640-65857

**Method: 8141A**
**Preparation: 3520C**

MS Lab Sample ID: 640-26237-M-1-A MS
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/26/2010 0850
Date Prepared: 02/22/2010 1420

Analysis Batch: 640-66015
Prep Batch: 640-65857

Instrument ID: SGF
Lab File ID: 2B25F60.d
Initial Weight/Volume: 500 mL
Final Weight/Volume: 2.5 mL
Injection Volume: 1 uL
Column ID: PRIMARY

MSD Lab Sample ID: 640-26237-M-1-B MSD
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/26/2010 0904
Date Prepared: 02/22/2010 1420

Analysis Batch: 640-66015
Prep Batch: 640-65857

Instrument ID: SGF
Lab File ID: 2B25F61.d
Initial Weight/Volume: 500 mL
Final Weight/Volume: 2.5 mL
Injection Volume: 1 uL
Column ID: PRIMARY

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Azinphos-methyl | 79 | 106 | 50 - 130 | 29 | 30 | | |
| Bolstar | 74 | 93 | 50 - 130 | 25 | 30 | | |
| Chlorpyrifos | 60 | 73 | 50 - 130 | 21 | 30 | | |
| Coumaphos | 92 | 120 | 50 - 130 | 26 | 30 | | |
| Demeton, Total | 46 | 56 | | 20 | | I | |
| Diazinon | 65 | 81 | 24 - 129 | 24 | 30 | | |
| Dichlorvos | 61 | 74 | 50 - 130 | 23 | 30 | I | I |
| EPN | 89 | 121 | 50 - 130 | 30 | 30 | | |
| Ethoprop | 64 | 77 | 50 - 130 | 21 | 30 | | |
| Fensulfothion | 77 | 104 | 50 - 130 | 33 | 30 | I | I J3 |
| Malathion | 70 | 88 | 50 - 130 | 22 | 30 | | |
| Mevinphos | 62 | 75 | 50 - 130 | 25 | 30 | I | I |
| Ethyl Parathion | 73 | 93 | 32 - 138 | 24 | 44 | | |
| Monochrotophos | 0 | 28 | 50 - 130 | NC | 30 | U J3 | I J3 |
| Methyl parathion | 66 | 83 | 32 - 137 | 23 | 48 | | |
| Naled | 38 | 51 | 50 - 130 | 33 | 30 | I J3 | J3 |
| Phorate | 51 | 64 | 50 - 130 | 37 | 30 | | J3 |
| Ronnel | 50 | 63 | 30 - 135 | 23 | 30 | | |
| Stirophos | 77 | 102 | 50 - 130 | 32 | 30 | | J3 |
| Tokuthion | 67 | 82 | 50 - 130 | 23 | 30 | | |
| Trichloronate | 60 | 76 | 50 - 130 | 22 | 30 | | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Method Blank - Batch: 660-90999**

**Method: 8151A**
**Preparation: 8151A**

Lab Sample ID: MB 660-90999/1-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/05/2010 0144
Date Prepared: 02/23/2010 1625

Analysis Batch: 660-91479
Prep Batch: 660-90999
Units: ug/L

Instrument ID: BSGJ
Lab File ID: 1C04J031.D
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Column ID: PRIMARY

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| 2,4,5-T | 1.0 | U | 1.0 | 5.0 |
| 2,4-D | 1.0 | U | 1.0 | 5.0 |
| 2,4-DB | 1.0 | U | 1.0 | 5.0 |
| Dalapon | 25 | U | 25 | 120 |
| Dicamba | 0.25 | U | 0.25 | 1.2 |
| Dichlorprop | 1.0 | U | 1.0 | 6.0 |
| Dinoseb | 1.0 | U | 1.0 | 6.0 |
| MCPA | 34 | U | 34 | 120 |
| MCPP | 35 | U | 35 | 120 |
| Pentachlorophenol | 0.085 | U | 0.085 | 1.0 |
| Picloram | 1.0 | U | 1.0 | 5.0 |
| Silvex (2,4,5-TP) | 1.0 | U | 1.0 | 5.0 |

| Surrogate | % Rec | Acceptance Limits |
|---|---|---|
| 2,4-Dichlorophenylacetic acid | 59 | 33 - 120 |

**Lab Control Sample/**
**Lab Control Sample Duplicate Recovery Report - Batch: 660-90999**

**Method: 8151A**
**Preparation: 8151A**

| | | | | | |
|---|---|---|---|---|---|
| LCS Lab Sample ID: | LCS 660-90999/2-A | Analysis Batch: 660-91479 | | Instrument ID: | BSGJ |
| Client Matrix: | Water | Prep Batch: 660-90999 | | Lab File ID: | 1C04J032.D |
| Dilution: | 1.0 | Units: ug/L | | Initial Weight/Volume: | 1000 mL |
| Date Analyzed: | 03/05/2010 0202 | | | Final Weight/Volume: | 10 mL |
| Date Prepared: | 02/23/2010 1625 | | | Injection Volume: | 2 uL |
| | | | | Column ID: | PRIMARY |

| | | | | | |
|---|---|---|---|---|---|
| LCSD Lab Sample ID: | LCSD 660-90999/3-A | Analysis Batch: 660-91479 | | Instrument ID: | BSGJ |
| Client Matrix: | Water | Prep Batch: 660-90999 | | Lab File ID: | 1C04J033.D |
| Dilution: | 1.0 | Units: ug/L | | Initial Weight/Volume: | 1000 mL |
| Date Analyzed: | 03/05/2010 0219 | | | Final Weight/Volume: | 10 mL |
| Date Prepared: | 02/23/2010 1625 | | | Injection Volume: | 2 uL |
| | | | | Column ID: | PRIMARY |

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | LCS | LCSD | Limit | RPD | RPD Limit | LCS Qual | LCSD Qual |
| 2,4,5-T | 106 | 101 | 50 - 130 | 5 | 48 | | |
| 2,4-D | 114 | 104 | 60 - 130 | 9 | 78 | | |
| 2,4-DB | 153 | 141 | 10 - 181 | 8 | 43 | | |
| Dalapon | 21 | 70 | 10 - 228 | 107 | 68 | | J3 |
| Dicamba | 88 | 85 | 24 - 150 | 4 | 46 | | |
| Dichlorprop | 84 | 78 | 13 - 130 | 7 | 95 | | |
| Dinoseb | 37 | 14 | 10 - 130 | 94 | 115 | | |
| MCPA | 458 | 369 | 10 - 158 | 21 | 28 | J3 | J3 |
| MCPP | 88 | 78 | 10 - 214 | 12 | 78 | | |
| Pentachlorophenol | 67 | 64 | 25 - 134 | 6 | 34 | | |
| Picloram | 112 | 105 | 10 - 150 | 7 | 56 | | |
| Silvex (2,4,5-TP) | 100 | 96 | 33 - 130 | 5 | 66 | | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Method Blank - Batch: 660-91293**

**Method: 8151A**
**Preparation: 8151A**

| | | | | | |
|---|---|---|---|---|---|
| Lab Sample ID: | MB 660-91293/1-A | Analysis Batch: | 660-91563 | Instrument ID: | BSGJ |
| Client Matrix: | Solid | Prep Batch: | 660-91293 | Lab File ID: | 1C07J012.D |
| Dilution: | 1.0 | Units: | ug/Kg | Initial Weight/Volume: | 30.00 g |
| Date Analyzed: | 03/07/2010 1518 | | | Final Weight/Volume: | 10 mL |
| Date Prepared: | 03/02/2010 1410 | | | Injection Volume: | 2 uL |
| | | | | Column ID: | PRIMARY |

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| 2,4,5-T | 10 | U | 10 | 50 |
| 2,4-D | 1.6 | U | 1.6 | 8.3 |
| 2,4-DB | 6.4 | U | 6.4 | 8.3 |
| Dalapon | 23 | U | 23 | 2000 |
| Dicamba | 12 | U | 12 | 50 |
| Dichlorprop | 25 | U | 25 | 100 |
| Dinoseb | 8.3 | U | 8.3 | 30 |
| MCPA | 740 | U | 740 | 2000 |
| MCPP | 400 | U | 400 | 2000 |
| Pentachlorophenol | 5.0 | U | 5.0 | 17 |
| Picloram | 1.2 | U | 1.2 | 3.3 |
| Silvex (2,4,5-TP) | 10 | U | 10 | 50 |

| Surrogate | % Rec | Acceptance Limits |
|---|---|---|
| 2,4-Dichlorophenylacetic acid | 59 | 10 - 135 |

**Lab Control Sample - Batch: 660-91293**

**Method: 8151A**
**Preparation: 8151A**

| | | | | | |
|---|---|---|---|---|---|
| Lab Sample ID: | LCS 660-91293/2-A | Analysis Batch: | 660-91563 | Instrument ID: | BSGJ |
| Client Matrix: | Solid | Prep Batch: | 660-91293 | Lab File ID: | 1C07J013.D |
| Dilution: | 1.0 | Units: | ug/Kg | Initial Weight/Volume: | 30.00 g |
| Date Analyzed: | 03/07/2010 1535 | | | Final Weight/Volume: | 10 mL |
| Date Prepared: | 03/02/2010 1410 | | | Injection Volume: | 2 uL |
| | | | | Column ID: | PRIMARY |

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| 2,4,5-T | 83.3 | 41.4 | 50 | 27 - 168 | |
| 2,4-D | 83.3 | 31.7 | 38 | 26 - 159 | |
| 2,4-DB | 83.3 | 57.9 | 69 | 10 - 181 | |
| Dalapon | 83.3 | 90.3 | 108 | 10 - 213 | |
| Dicamba | 83.3 | 78.2 | 94 | 29 - 145 | |
| Dichlorprop | 83.3 | 58.9 | 71 | 28 - 130 | |
| Dinoseb | 83.3 | 8.3 | 5 | 10 - 130 | J3 |
| MCPA | 8330 | 3190 | 38 | 29 - 134 | |
| MCPP | 8330 | 4830 | 58 | 13 - 157 | |
| Pentachlorophenol | 83.3 | 51.5 | 62 | 16 - 132 | |
| Picloram | 83.3 | 72.9 | 88 | 10 - 150 | |
| Silvex (2,4,5-TP) | 83.3 | 54.5 | 65 | 32 - 134 | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Matrix Spike/**
**Matrix Spike Duplicate Recovery Report - Batch: 660-91293**

**Method: 8151A**
**Preparation: 8151A**

MS Lab Sample ID: 660-33914-11
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/08/2010 2215
Date Prepared: 03/02/2010 1410

Analysis Batch: 660-91563
Prep Batch: 660-91293

Instrument ID: BSGJ
Lab File ID: 1C08J020.D
Initial Weight/Volume: 29.58 g
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Column ID: PRIMARY

---

MSD Lab Sample ID: 660-33914-11
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/08/2010 2233
Date Prepared: 03/02/2010 1410

Analysis Batch: 660-91563
Prep Batch: 660-91293

Instrument ID: BSGJ
Lab File ID: 1C08J021.D
Initial Weight/Volume: 29.58 g
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Column ID: PRIMARY

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| 2,4,5-T | 110 | 110 | 27 - 168 | 0 | 59 | | |
| 2,4-D | 93 | 91 | 26 - 159 | 3 | 47 | | |
| 2,4-DB | 175 | 191 | 10 - 181 | 9 | 40 | | J3 |
| Dalapon | 0 | 0 | 10 - 213 | NC | 40 | J3 | J3 |
| Dicamba | 99 | 106 | 29 - 145 | 7 | 40 | | |
| Dichlorprop | 103 | 117 | 28 - 130 | 12 | 40 | | |
| Dinoseb | 117 | 143 | 10 - 130 | 20 | 50 | | J3 |
| MCPA | 102 | 107 | 29 - 134 | 5 | 50 | | |
| MCPP | 111 | 134 | 13 - 157 | 19 | 50 | | |
| Pentachlorophenol | 118 | 147 | 16 - 132 | 22 | 40 | | J3 |
| Picloram | 18 | 17 | 10 - 150 | 10 | 40 | | |
| Silvex (2,4,5-TP) | 154 | 178 | 32 - 134 | 14 | 51 | J3 | J3 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Method Blank - Batch: 660-90981**

**Method: 6010B**
**Preparation: 3050B**

Lab Sample ID: MB 660-90981/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/01/2010 1216
Date Prepared: 02/23/2010 1202

Analysis Batch: 660-91239
Prep Batch: 660-90981
Units: mg/Kg

Instrument ID: ICPA
Lab File ID: 10C01A
Initial Weight/Volume: 1.00 g
Final Weight/Volume: 50 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Aluminum | 5.8 | U | 5.8 | 20 |
| Arsenic | 0.23 | U | 0.23 | 0.50 |
| Boron | 0.59 | U | 0.59 | 5.0 |
| Barium | 0.16 | U | 0.16 | 1.0 |
| Calcium | 15 | U | 15 | 50 |
| Cadmium | 0.087 | U | 0.087 | 0.50 |
| Cobalt | 0.19 | U | 0.19 | 1.0 |
| Chromium | 0.17 | U | 0.17 | 1.0 |
| Copper | 0.50 | U | 0.50 | 2.0 |
| Iron | 3.0 | U | 3.0 | 5.0 |
| Magnesium | 6.8 | U | 6.8 | 50 |
| Manganese | 0.21 | U | 0.21 | 1.0 |
| Sodium | 18 | U | 18 | 50 |
| Lead | 0.15 | U | 0.15 | 0.50 |
| Strontium | 0.098 | U | 0.098 | 1.0 |
| Titanium | 0.30 | U | 0.30 | 1.0 |
| Vanadium | 0.11 | U | 0.11 | 1.0 |
| Zinc | 0.50 | U | 0.50 | 2.0 |

## Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Lab Control Sample - Batch: 660-90981**

**Method: 6010B**
**Preparation: 3050B**

Lab Sample ID: LCS 660-90981/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/01/2010 1222
Date Prepared: 02/23/2010 1202

Analysis Batch: 660-91239
Prep Batch: 660-90981
Units: mg/Kg

Instrument ID: ICPA
Lab File ID: 10C01A
Initial Weight/Volume: 1.00 g
Final Weight/Volume: 50 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Aluminum | 50.0 | 48.7 | 97 | 75 - 125 | |
| Arsenic | 50.0 | 50.0 | 100 | 75 - 125 | |
| Boron | 50.0 | 48.6 | 97 | 75 - 125 | |
| Barium | 50.0 | 49.5 | 99 | 75 - 125 | |
| Calcium | 50.0 | 52.8 | 106 | 75 - 125 | |
| Cadmium | 50.0 | 52.2 | 104 | 75 - 125 | |
| Cobalt | 50.0 | 48.7 | 97 | 75 - 125 | |
| Chromium | 49.5 | 51.8 | 105 | 75 - 125 | |
| Copper | 50.0 | 50.0 | 100 | 75 - 125 | |
| Iron | 50.0 | 52.2 | 104 | 75 - 125 | |
| Magnesium | 50.0 | 50.7 | 101 | 75 - 125 | |
| Manganese | 50.0 | 52.3 | 105 | 75 - 125 | |
| Sodium | 500 | 505 | 101 | 75 - 125 | |
| Lead | 50.0 | 51.9 | 104 | 75 - 125 | |
| Strontium | 50.0 | 53.0 | 106 | 75 - 125 | |
| Titanium | 50.0 | 52.7 | 105 | 75 - 125 | |
| Vanadium | 50.0 | 51.9 | 104 | 75 - 125 | |
| Zinc | 50.0 | 52.3 | 105 | 75 - 125 | |

## Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Matrix Spike/**
**Matrix Spike Duplicate Recovery Report - Batch: 660-90981**

**Method: 6010B**
**Preparation: 3050B**

MS Lab Sample ID: 660-33921-A-3-B MS
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/01/2010 1240
Date Prepared: 02/23/2010 1202

Analysis Batch: 660-91239
Prep Batch: 660-90981

Instrument ID: ICPA
Lab File ID: 10C01A
Initial Weight/Volume: 1.01 g
Final Weight/Volume: 50 mL

MSD Lab Sample ID: 660-33921-A-3-C MSD
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/01/2010 1246
Date Prepared: 02/23/2010 1202

Analysis Batch: 660-91239
Prep Batch: 660-90981

Instrument ID: ICPA
Lab File ID: 10C01A
Initial Weight/Volume: 1.01 g
Final Weight/Volume: 50 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Aluminum | 2230 | 1750 | 75 - 125 | 6 | 20 | J3 | J3 |
| Arsenic | 95 | 95 | 75 - 125 | 0 | 20 | | |
| Boron | 94 | 94 | 75 - 125 | 0 | 20 | | |
| Barium | 98 | 92 | 75 - 125 | 5 | 20 | | |
| Calcium | 136 | 116 | 75 - 125 | 2 | 20 | J3 | |
| Cadmium | 99 | 99 | 75 - 125 | 1 | 20 | | |
| Cobalt | 92 | 92 | 75 - 125 | 0 | 20 | | |
| Chromium | 101 | 101 | 75 - 125 | 0 | 20 | | |
| Copper | 97 | 96 | 75 - 125 | 1 | 20 | | |
| Iron | 158 | 227 | 75 - 125 | 2 | 20 | J3 | J3 |
| Magnesium | 169 | 168 | 75 - 125 | 0 | 20 | J3 | J3 |
| Manganese | 100 | 102 | 75 - 125 | 2 | 20 | | |
| Sodium | 97 | 97 | 75 - 125 | 0 | 20 | | |
| Lead | 98 | 98 | 75 - 125 | 1 | 20 | | |
| Strontium | 105 | 94 | 75 - 125 | 7 | 20 | | |
| Titanium | 76 | 76 | 75 - 125 | 0 | 20 | | |
| Vanadium | 100 | 100 | 75 - 125 | 0 | 20 | | |
| Zinc | 102 | 104 | 75 - 125 | 2 | 20 | | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

## Method Blank - Batch: 660-91157

**Method: 6010B**
**Preparation: 3005A**
**Total Recoverable**

Lab Sample ID: MB 660-91157/1-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/02/2010 1106
Date Prepared: 02/26/2010 0900

Analysis Batch: 660-91268
Prep Batch: 660-91157
Units: mg/L

Instrument ID: ICPA
Lab File ID: 10C02A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Potassium | 0.19 | U | 0.19 | 1.0 |
| Copper | 0.0029 | U | 0.0029 | 0.010 |
| Iron | 0.050 | U | 0.050 | 0.20 |
| Magnesium | 0.020 | U | 0.020 | 0.080 |
| Sodium | 0.31 | U | 0.31 | 0.50 |
| Lead | 0.0020 | U | 0.0020 | 0.010 |
| Zinc | 0.0050 | U | 0.0050 | 0.020 |

## Lab Control Sample - Batch: 660-91157

**Method: 6010B**
**Preparation: 3005A**
**Total Recoverable**

Lab Sample ID: LCS 660-91157/2-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/02/2010 1112
Date Prepared: 02/26/2010 0900

Analysis Batch: 660-91268
Prep Batch: 660-91157
Units: mg/L

Instrument ID: ICPA
Lab File ID: 10C02A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Potassium | 10.0 | 9.40 | 94 | 75 - 125 | |
| Copper | 1.00 | 1.01 | 101 | 75 - 125 | |
| Iron | 1.00 | 1.04 | 104 | 75 - 125 | |
| Magnesium | 1.00 | 1.02 | 102 | 75 - 125 | |
| Sodium | 10.0 | 10.3 | 103 | 75 - 125 | |
| Lead | 1.00 | 1.02 | 102 | 75 - 125 | |
| Zinc | 1.00 | 1.02 | 102 | 75 - 125 | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Matrix Spike/**
**Matrix Spike Duplicate Recovery Report - Batch: 660-91157**

**Method: 6010B**
**Preparation: 3005A**
**Total Recoverable**

| | | | | | |
|---|---|---|---|---|---|
| MS Lab Sample ID: | 660-33915-F-2-B MS | Analysis Batch: | 660-91268 | Instrument ID: | ICPA |
| Client Matrix: | Water | Prep Batch: | 660-91157 | Lab File ID: | 10C02A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 50 mL |
| Date Analyzed: | 03/02/2010 1130 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/26/2010 0900 | | | | |

| | | | | | |
|---|---|---|---|---|---|
| MSD Lab Sample ID: | 660-33915-F-2-C MSD | Analysis Batch: | 660-91268 | Instrument ID: | ICPA |
| Client Matrix: | Water | Prep Batch: | 660-91157 | Lab File ID: | 10C02A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 50 mL |
| Date Analyzed: | 03/02/2010 1136 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | 02/26/2010 0900 | | | | |

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Potassium | 95 | 95 | 75 - 125 | 0 | 20 | | |
| Copper | 102 | 102 | 75 - 125 | 0 | 20 | | |
| Iron | 116 | 103 | 75 - 125 | 12 | 20 | | |
| Magnesium | 101 | 100 | 75 - 125 | 0 | 20 | | |
| Sodium | 103 | 104 | 75 - 125 | 1 | 20 | | |
| Lead | 101 | 101 | 75 - 125 | 0 | 20 | | |
| Zinc | 100 | 100 | 75 - 125 | 0 | 20 | | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Method Blank - Batch: 700-79169**

**Method: 7470A**
**Preparation: 7470A**

Lab Sample ID: MB 700-79169/1-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/24/2010 1748
Date Prepared: 02/24/2010 0915

Analysis Batch: 700-79238
Prep Batch: 700-79169
Units: mg/L

Instrument ID: LEEMAN HYDRA
Lab File ID: N/A
Initial Weight/Volume: 40 mL
Final Weight/Volume: 40 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Mercury | 0.000071 | U | 0.000071 | 0.00020 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Method Blank - Batch: 700-79182**

**Method: 7471A**
**Preparation: 7471A**

Lab Sample ID: MB 700-79182/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/24/2010 1647
Date Prepared: 02/24/2010 1100

Analysis Batch: 700-79230
Prep Batch: 700-79182
Units: mg/Kg

Instrument ID: LEEMAN HYDRA
Lab File ID: N/A
Initial Weight/Volume: 0.40 g
Final Weight/Volume: 40 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Mercury | 0.014 | U | 0.014 | 0.020 |

## Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Method Blank - Batch: 660-90881**

**Method: 180.1**
**Preparation: N/A**

Lab Sample ID: MB 660-90881/3
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 1030
Date Prepared: N/A

Analysis Batch: 660-90881
Prep Batch: N/A
Units: NTU

Instrument ID: Turbidity2
Lab File ID: N/A
Initial Weight/Volume:
Final Weight/Volume: 30 mL

| Analyte | Result | Qual | PQL | PQL |
|---|---|---|---|---|
| Turbidity | 0.10 | U | 0.10 | 0.10 |

**Lab Control Sample - Batch: 660-90881**

**Method: 180.1**
**Preparation: N/A**

Lab Sample ID: LCS 660-90881/4
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 1030
Date Prepared: N/A

Analysis Batch: 660-90881
Prep Batch: N/A
Units: NTU

Instrument ID: Turbidity2
Lab File ID: N/A
Initial Weight/Volume:
Final Weight/Volume: 30 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Turbidity | 40.0 | 41.5 | 104 | 90 - 110 | |

**Duplicate - Batch: 660-90881**

**Method: 180.1**
**Preparation: N/A**

Lab Sample ID: 660-33914-5
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 1030
Date Prepared: N/A

Analysis Batch: 660-90881
Prep Batch: N/A
Units: NTU

Instrument ID: Turbidity2
Lab File ID: N/A
Initial Weight/Volume:
Final Weight/Volume: 30 mL

| Analyte | Sample Result/Qual | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|
| Turbidity | 4.6 | 4.61 | 0 | 20 | |

### Method Blank - Batch: 680-161659

**Method: 350.1**
**Preparation: 3-154**

Lab Sample ID: MB 680-161659/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/26/2010 1111
Date Prepared: 02/25/2010 1234

Analysis Batch: 680-161811
Prep Batch: 680-161659
Units: mg/Kg

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 20.05 g
Final Weight/Volume: 100 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Ammonia (as N) | 0.13 | U | 0.13 | 0.30 |

### Lab Control Sample - Batch: 680-161659

**Method: 350.1**
**Preparation: 3-154**

Lab Sample ID: LCS 680-161659/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/26/2010 1111
Date Prepared: 02/25/2010 1234

Analysis Batch: 680-161811
Prep Batch: 680-161659
Units: mg/Kg

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 19.95 g
Final Weight/Volume: 100 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Ammonia (as N) | 5.01 | 4.94 | 99 | 75 - 125 | |

### Matrix Spike/ Matrix Spike Duplicate Recovery Report - Batch: 680-161659

**Method: 350.1**
**Preparation: 3-154**

MS Lab Sample ID: 660-33863-D-2-B MS
Client Matrix: Solid
Dilution: 10
Date Analyzed: 02/26/2010 1159
Date Prepared: 02/25/2010 1234

Analysis Batch: 680-161811
Prep Batch: 680-161659

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 19.99 g
Final Weight/Volume: 100 mL

MSD Lab Sample ID: 660-33863-D-2-C MSD
Client Matrix: Solid
Dilution: 10
Date Analyzed: 02/26/2010 1159
Date Prepared: 02/25/2010 1234

Analysis Batch: 680-161811
Prep Batch: 680-161659

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 20.00 g
Final Weight/Volume: 100 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Ammonia (as N) | 42 | 73 | 75 - 125 | 3 | 30 | J3 | J3 |

## Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Duplicate - Batch: 680-161659**

**Method: 350.1**
**Preparation: 3-154**

Lab Sample ID: 660-33914-8
Client Matrix: Solid
Dilution: 2.0
Date Analyzed: 02/26/2010 1148
Date Prepared: 02/25/2010 1234

Analysis Batch: 680-161811
Prep Batch: 680-161659
Units: mg/Kg

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 20.06 g
Final Weight/Volume: 100 mL

| Analyte | Sample Result/Qual | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|
| Ammonia (as N) | 9.3 | 11.1 | 17 | 30 | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

## Method Blank - Batch: 660-91786

**Method: 350.1**
**Preparation: N/A**

Lab Sample ID: MB 660-91786/11
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/15/2010 1120
Date Prepared: N/A

Analysis Batch: 660-91786
Prep Batch: N/A
Units: mg/L

Instrument ID: LACHAT
Lab File ID: N/A
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Ammonia (as N) | 0.010 | U | 0.010 | 0.020 |

## Lab Control Sample - Batch: 660-91786

**Method: 350.1**
**Preparation: N/A**

Lab Sample ID: LCS 660-91786/12
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/15/2010 1121
Date Prepared: N/A

Analysis Batch: 660-91786
Prep Batch: N/A
Units: mg/L

Instrument ID: LACHAT
Lab File ID: N/A
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Ammonia (as N) | 0.500 | 0.511 | 102 | 90 - 110 | |

## Matrix Spike/ Matrix Spike Duplicate Recovery Report - Batch: 660-91786

**Method: 350.1**
**Preparation: N/A**

MS Lab Sample ID: 660-34207-B-1 MS
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/15/2010 1123
Date Prepared: N/A

Analysis Batch: 660-91786
Prep Batch: N/A

Instrument ID: LACHAT
Lab File ID: N/A
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10 mL

MSD Lab Sample ID: 660-34207-B-1 MSD
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/15/2010 1125
Date Prepared: N/A

Analysis Batch: 660-91786
Prep Batch: N/A

Instrument ID: LACHAT
Lab File ID: N/A
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Ammonia (as N) | 107 | 109 | 90 - 110 | 2 | 30 | | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Method Blank - Batch: 660-90874**

**Method: 353.2**
**Preparation: N/A**

Lab Sample ID: MB 660-90874/1
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 0955
Date Prepared: N/A

Analysis Batch: 660-90874
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Nitrate Nitrite as N | 0.10 | U | 0.10 | 0.50 |
| Nitrite as N | 0.10 | U | 0.10 | 0.50 |
| Nitrate as N | 0.10 | U | 0.10 | 0.50 |

**Lab Control Sample - Batch: 660-90874**

**Method: 353.2**
**Preparation: N/A**

Lab Sample ID: LCS 660-90874/2
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 0955
Date Prepared: N/A

Analysis Batch: 660-90874
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Nitrate Nitrite as N | 1.00 | 0.959 | 96 | 90 - 110 | |
| Nitrite as N | 1.00 | 0.948 | 95 | 90 - 110 | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Matrix Spike/**
**Matrix Spike Duplicate Recovery Report - Batch: 660-90874**

**Method: 353.2**
**Preparation: N/A**

MS Lab Sample ID: 660-33914-6
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 0955
Date Prepared: N/A

Analysis Batch: 660-90874
Prep Batch: N/A

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

MSD Lab Sample ID: 660-33914-6
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/19/2010 0955
Date Prepared: N/A

Analysis Batch: 660-90874
Prep Batch: N/A

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Nitrate Nitrite as N | 94 | 98 | 90 - 110 | 4 | 30 | | |
| Nitrite as N | 105 | 97 | 90 - 110 | 8 | 30 | | |

## Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Method Blank - Batch: 660-91352**

**Method: 353.2**
**Preparation: N/A**

Lab Sample ID: MB 660-91350/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/03/2010 0939
Date Prepared: N/A
Date Leached: 03/01/2010 1600

Analysis Batch: 660-91352
Prep Batch: N/A
Units: mg/Kg
Leachate Batch: 660-91350

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Nitrate Nitrite as N-Soluble | 1.0 | U | 1.0 | 5.0 |
| Nitrite as N-Soluble | 1.0 | U | 1.0 | 5.0 |
| Nitrate as N-Soluble | 1.0 | U | 1.0 | 5.0 |

**Lab Control Sample - Batch: 660-91352**

**Method: 353.2**
**Preparation: N/A**

Lab Sample ID: LCS 660-91350/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/03/2010 0939
Date Prepared: N/A
Date Leached: 03/01/2010 1600

Analysis Batch: 660-91352
Prep Batch: N/A
Units: mg/Kg
Leachate Batch: 660-91350

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Nitrate Nitrite as N-Soluble | 10.0 | 9.80 | 98 | 90 - 110 | |
| Nitrite as N-Soluble | 10.0 | 9.46 | 95 | 90 - 110 | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Matrix Spike/**
**Matrix Spike Duplicate Recovery Report - Batch: 660-91352**

**Method: 353.2**
**Preparation: N/A**

| | | | | | |
|---|---|---|---|---|---|
| MS Lab Sample ID: | 660-33914-10 | Analysis Batch: | 660-91352 | Instrument ID: | No Equipment Assigned |
| Client Matrix: | Solid | Prep Batch: | N/A | Lab File ID: | N/A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 50 mL |
| Date Analyzed: | 03/03/2010 0939 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | N/A | | | | |
| Date Leached: | 03/01/2010 1600 | Leachate Batch: | 660-91350 | | |

| | | | | | |
|---|---|---|---|---|---|
| MSD Lab Sample ID: | 660-33914-10 | Analysis Batch: | 660-91352 | Instrument ID: | No Equipment Assigned |
| Client Matrix: | Solid | Prep Batch: | N/A | Lab File ID: | N/A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 50 mL |
| Date Analyzed: | 03/03/2010 0939 | | | Final Weight/Volume: | 50 mL |
| Date Prepared: | N/A | | | | |
| Date Leached: | 03/01/2010 1600 | Leachate Batch: | 660-91350 | | |

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Nitrate Nitrite as N-Soluble | 106 | 112 | 90 - 110 | 6 | 20 | | J3 |

### Method Blank - Batch: 680-161349

**Method: 365.4**
**Preparation: 365.2/365.3/365**

| | | | | | |
|---|---|---|---|---|---|
| Lab Sample ID: | MB 680-161349/1-A | Analysis Batch: | 680-161565 | Instrument ID: | KONELAB1 |
| Client Matrix: | Solid | Prep Batch: | 680-161349 | Lab File ID: | N/A |
| Dilution: | 1.0 | Units: | mg/Kg | Initial Weight/Volume: | 0.200 g |
| Date Analyzed: | 02/24/2010 1400 | | | Final Weight/Volume: | 40 mL |
| Date Prepared: | 02/22/2010 1258 | | | | |

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Phosphorus | 11 | U | 11 | 20 |

### Lab Control Sample/
### Lab Control Sample Duplicate Recovery Report - Batch: 680-161349

**Method: 365.4**
**Preparation: 365.2/365.3/365**

| | | | | | |
|---|---|---|---|---|---|
| LCS Lab Sample ID: | LCS 680-161349/2-A | Analysis Batch: | 680-161565 | Instrument ID: | KONELAB1 |
| Client Matrix: | Solid | Prep Batch: | 680-161349 | Lab File ID: | N/A |
| Dilution: | 1.0 | Units: | mg/Kg | Initial Weight/Volume: | 0.200 g |
| Date Analyzed: | 02/24/2010 1400 | | | Final Weight/Volume: | 40 mL |
| Date Prepared: | 02/22/2010 1258 | | | | |

| | | | | | |
|---|---|---|---|---|---|
| LCSD Lab Sample ID: | LCSD 680-161349/3-A | Analysis Batch: | 680-161565 | Instrument ID: | KONELAB1 |
| Client Matrix: | Solid | Prep Batch: | 680-161349 | Lab File ID: | N/A |
| Dilution: | 1.0 | Units: | mg/Kg | Initial Weight/Volume: | 0.200 g |
| Date Analyzed: | 02/24/2010 1400 | | | Final Weight/Volume: | 40 mL |
| Date Prepared: | 02/22/2010 1258 | | | | |

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | LCS | LCSD | Limit | RPD | RPD Limit | LCS Qual | LCSD Qual |
| Phosphorus | 95 | 97 | 60 - 140 | 3 | 40 | | |

### Duplicate - Batch: 680-161349

**Method: 365.4**
**Preparation: 365.2/365.3/365**

| | | | | | |
|---|---|---|---|---|---|
| Lab Sample ID: | 660-33914-11 | Analysis Batch: | 680-161565 | Instrument ID: | KONELAB1 |
| Client Matrix: | Solid | Prep Batch: | 680-161349 | Lab File ID: | N/A |
| Dilution: | 1.0 | Units: | mg/Kg | Initial Weight/Volume: | 0.2395 g |
| Date Analyzed: | 02/24/2010 1417 | | | Final Weight/Volume: | 40 mL |
| Date Prepared: | 02/22/2010 1258 | | | | |

| Analyte | Sample Result/Qual | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|
| Phosphorus | 270 | 432 | 45 | 40 | J3 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Method Blank - Batch: 660-91250**

**Method: 365.4**
**Preparation: 365.2/365.3/365**

Lab Sample ID: MB 660-91250/10-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/03/2010 1113
Date Prepared: 03/01/2010 1700

Analysis Batch: 660-91349
Prep Batch: 660-91250
Units: mg/L

Instrument ID: SEAL1
Lab File ID: N/A
Initial Weight/Volume: 20 mL
Final Weight/Volume: 20 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Phosphorus, Total | 0.10 | U | 0.10 | 0.30 |

**Lab Control Sample - Batch: 660-91250**

**Method: 365.4**
**Preparation: 365.2/365.3/365**

Lab Sample ID: LCS 660-91250/11-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/03/2010 1113
Date Prepared: 03/01/2010 1700

Analysis Batch: 660-91349
Prep Batch: 660-91250
Units: mg/L

Instrument ID: SEAL1
Lab File ID: N/A
Initial Weight/Volume: 20 mL
Final Weight/Volume: 20 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Phosphorus, Total | 3.00 | 3.03 | 101 | 90 - 110 | |

**Matrix Spike/**
**Matrix Spike Duplicate Recovery Report - Batch: 660-91250**

**Method: 365.4**
**Preparation: 365.2/365.3/365**

MS Lab Sample ID: 660-33914-3
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/03/2010 1113
Date Prepared: 03/01/2010 1700

Analysis Batch: 660-91349
Prep Batch: 660-91250

Instrument ID: SEAL1
Lab File ID: N/A
Initial Weight/Volume: 20 mL
Final Weight/Volume: 20 mL

MSD Lab Sample ID: 660-33914-3
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/03/2010 1113
Date Prepared: 03/01/2010 1700

Analysis Batch: 660-91349
Prep Batch: 660-91250

Instrument ID: SEAL1
Lab File ID: N/A
Initial Weight/Volume: 20 mL
Final Weight/Volume: 20 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Phosphorus, Total | 94 | 105 | 90 - 110 | 9 | 30 | | |

## Method Blank - Batch: 680-161395

**Method: 9034**
**Preparation: 9030B**

Lab Sample ID: MB 680-161395/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/23/2010 1430
Date Prepared: 02/23/2010 1144

Analysis Batch: 680-161436
Prep Batch: 680-161395
Units: mg/Kg

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 10.00 g
Final Weight/Volume: 250 mL

| Analyte | Result | Qual | PQL | PQL |
|---|---|---|---|---|
| Sulfide | 25 | U | 25 | 25 |

## Lab Control Sample - Batch: 680-161395

**Method: 9034**
**Preparation: 9030B**

Lab Sample ID: LCS 680-161395/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/23/2010 1430
Date Prepared: 02/23/2010 1144

Analysis Batch: 680-161436
Prep Batch: 680-161395
Units: mg/Kg

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 10.00 g
Final Weight/Volume: 250 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Sulfide | 252 | 207 | 82 | 50 - 150 | |

## Matrix Spike/
## Matrix Spike Duplicate Recovery Report - Batch: 680-161395

**Method: 9034**
**Preparation: 9030B**

MS Lab Sample ID: 660-33863-E-4-C MS
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/23/2010 1430
Date Prepared: 02/23/2010 1144

Analysis Batch: 680-161436
Prep Batch: 680-161395

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 10.03 g
Final Weight/Volume: 250 mL

MSD Lab Sample ID: 660-33863-E-4-D MSD
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/23/2010 1430
Date Prepared: 02/23/2010 1144

Analysis Batch: 680-161436
Prep Batch: 680-161395

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 10.03 g
Final Weight/Volume: 250 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Sulfide | 84 | 83 | 50 - 150 | 2 | 50 | | |

## Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

### Method Blank - Batch: 680-162106

**Method: 9038**
**Preparation: N/A**

Lab Sample ID: MB 680-162053/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/02/2010 1707
Date Prepared: N/A
Date Leached: 03/02/2010 1138

Analysis Batch: 680-162106
Prep Batch: N/A
Units: mg/Kg
Leachate Batch: 680-162053

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL

| Analyte | Result | Qual | PQL | PQL |
|---|---|---|---|---|
| Sulfate-Soluble | 100 | U | 100 | 100 |

### Lab Control Sample/ Lab Control Sample Duplicate Recovery Report - Batch: 680-162106

**Method: 9038**
**Preparation: N/A**

LCS Lab Sample ID: LCS 680-162053/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/02/2010 1707
Date Prepared: N/A
Date Leached: 03/02/2010 1138

Analysis Batch: 680-162106
Prep Batch: N/A
Units: mg/Kg
Leachate Batch: 680-162053

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL

LCSD Lab Sample ID: LCSD 680-162053/3-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/02/2010 1707
Date Prepared: N/A
Date Leached: 03/02/2010 1138

Analysis Batch: 680-162106
Prep Batch: N/A
Units: mg/Kg
Leachate Batch: 680-162053

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL

|  | % Rec. |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|
| Analyte | LCS | LCSD | Limit | RPD | RPD Limit | LCS Qual | LCSD Qual |
| Sulfate-Soluble | 100 | 100 | 75 - 125 | 0 | 30 |  |  |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

## Matrix Spike/ Matrix Spike Duplicate Recovery Report - Batch: 680-162106

**Method: 9038**
**Preparation: N/A**

MS Lab Sample ID: 660-33863-D-1-C MS
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/02/2010 1709
Date Prepared: N/A
Date Leached: 03/02/2010 1138

Analysis Batch: 680-162106
Prep Batch: N/A
Leachate Batch: 680-162053

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL

MSD Lab Sample ID: 660-33863-D-1-D MSD
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/02/2010 1709
Date Prepared: N/A
Date Leached: 03/02/2010 1138

Analysis Batch: 680-162106
Prep Batch: N/A
Leachate Batch: 680-162053

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Sulfate-Soluble | 119 | 113 | 75 - 125 | 7 | 30 | | |

## Duplicate - Batch: 680-162106

**Method: 9038**
**Preparation: N/A**

Lab Sample ID: 660-33914-11
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/02/2010 1726
Date Prepared: N/A
Date Leached: 03/02/2010 1138

Analysis Batch: 680-162106
Prep Batch: N/A
Units: mg/Kg
Leachate Batch: 680-162053

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 1.0 mL

| Analyte | Sample Result/Qual | | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|---|
| Sulfate-Soluble | 96 | U | 98 | NC | 30 | U |

### Method Blank - Batch: 660-91134

**Method: 9045C**
**Preparation: N/A**

Lab Sample ID: MB 660-90928/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/20/2010 1000
Date Prepared: N/A
Date Leached: 02/20/2010 0900

Analysis Batch: 660-91134
Prep Batch: N/A
Units: SU
Leachate Batch: 660-90928

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 10 mL

| Analyte | Result | Qual | PQL | PQL |
|---|---|---|---|---|
| pH-Soluble | 6.220 | | 1.00 | 1.00 |

### Lab Control Sample - Batch: 660-91134

**Method: 9045C**
**Preparation: N/A**

Lab Sample ID: LCS 660-90928/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/20/2010 1000
Date Prepared: N/A
Date Leached: 02/20/2010 0900

Analysis Batch: 660-91134
Prep Batch: N/A
Units: SU
Leachate Batch: 660-90928

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 10 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| pH-Soluble | 6.00 | 6.000 | 100 | 98 - 102 | |

### Duplicate - Batch: 660-91134

**Method: 9045C**
**Preparation: N/A**

Lab Sample ID: 660-33914-11
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/20/2010 1000
Date Prepared: N/A
Date Leached: 02/20/2010 0900

Analysis Batch: 660-91134
Prep Batch: N/A
Units: SU
Leachate Batch: 660-90928

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 10 mL

| Analyte | Sample Result/Qual | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|
| pH-Soluble | 7.51 | 7.530 | 0 | 20 | Q |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

## Method Blank - Batch: 680-161519

**Method: 9060**
**Preparation: N/A**

Lab Sample ID: MB 680-161519/1
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/23/2010 1035
Date Prepared: N/A

Analysis Batch: 680-161519
Prep Batch: N/A
Units: mg/Kg

Instrument ID: TOC2
Lab File ID: N/A
Initial Weight/Volume: 100 mg
Final Weight/Volume: 1.0 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Total Organic Carbon | 1000 | U | 1000 | 3000 |

## Lab Control Sample - Batch: 680-161519

**Method: 9060**
**Preparation: N/A**

Lab Sample ID: LCS 680-161519/2
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/23/2010 1035
Date Prepared: N/A

Analysis Batch: 680-161519
Prep Batch: N/A
Units: mg/Kg

Instrument ID: TOC2
Lab File ID: N/A
Initial Weight/Volume: 20.5 mg
Final Weight/Volume: 1.0 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Total Organic Carbon | 408000 | 377000 | 92 | 60 - 140 | |

## Matrix Spike/ Matrix Spike Duplicate Recovery Report - Batch: 680-161519

**Method: 9060**
**Preparation: N/A**

MS Lab Sample ID: 680-55167-A-8 MS
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/23/2010 1035
Date Prepared: N/A

Analysis Batch: 680-161519
Prep Batch: N/A

Instrument ID: TOC2
Lab File ID: N/A
Initial Weight/Volume: 113.5 mg
Final Weight/Volume: 113.5 mg

MSD Lab Sample ID: 680-55167-A-8 MSD
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/23/2010 1035
Date Prepared: N/A

Analysis Batch: 680-161519
Prep Batch: N/A

Instrument ID: TOC2
Lab File ID: N/A
Initial Weight/Volume: 113.1 mg
Final Weight/Volume: 113.1 mg

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Total Organic Carbon | 83 | 83 | 60 - 140 | 1 | 40 | | |

## Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Duplicate - Batch: 680-161519**

**Method: 9060**
**Preparation: N/A**

Lab Sample ID: 680-55167-A-2 DU
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 02/23/2010 1035
Date Prepared: N/A

Analysis Batch: 680-161519
Prep Batch: N/A
Units: mg/Kg

Instrument ID: TOC2
Lab File ID: N/A
Initial Weight/Volume: 97.0 mg
Final Weight/Volume: 1.0 mL

| Analyte | Sample Result/Qual | | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|---|
| Total Organic Carbon | 1500 | I | 1760 | 13 | 40 | I |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

## Method Blank - Batch: 660-91047

**Method: SM 2320B**
**Preparation: N/A**

Lab Sample ID: MB 660-91047/3
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/24/2010 1240
Date Prepared: N/A

Analysis Batch: 660-91047
Prep Batch: N/A
Units: mg/L

Instrument ID: MANTECH
Lab File ID: N/A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Result | Qual | PQL | PQL |
|---|---|---|---|---|
| Alkalinity | 1.0 | U | 1.0 | 1.0 |

## Lab Control Sample - Batch: 660-91047

**Method: SM 2320B**
**Preparation: N/A**

Lab Sample ID: LCS 660-91047/4
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/24/2010 1248
Date Prepared: N/A

Analysis Batch: 660-91047
Prep Batch: N/A
Units: mg/L

Instrument ID: MANTECH
Lab File ID: N/A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Alkalinity | 118 | 119 | 100 | 80 - 120 | |

## Duplicate - Batch: 660-91047

**Method: SM 2320B**
**Preparation: N/A**

Lab Sample ID: 660-33914-1
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/24/2010 1259
Date Prepared: N/A

Analysis Batch: 660-91047
Prep Batch: N/A
Units: mg/L

Instrument ID: MANTECH
Lab File ID: N/A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

| Analyte | Sample Result/Qual | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|
| Alkalinity | 160 | 167 | 4 | 30 | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

## Method Blank - Batch: 660-91136

**Method: SM 2520B**
**Preparation: N/A**

Lab Sample ID: MB 660-91136/1
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1200
Date Prepared: N/A

Analysis Batch: 660-91136
Prep Batch: N/A
Units: ppt

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 100 mL

| Analyte | Result | Qual | PQL | PQL |
|---|---|---|---|---|
| Salinity | 2.0 | U | 2.0 | 2.0 |

## Lab Control Sample/ Lab Control Sample Duplicate Recovery Report - Batch: 660-91136

**Method: SM 2520B**
**Preparation: N/A**

LCS Lab Sample ID: LCS 660-91136/2
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1200
Date Prepared: N/A

Analysis Batch: 660-91136
Prep Batch: N/A
Units: ppt

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 100 mL

LCSD Lab Sample ID: LCSD 660-91136/3
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1200
Date Prepared: N/A

Analysis Batch: 660-91136
Prep Batch: N/A
Units: ppt

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 100 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | LCS | LCSD | Limit | RPD | RPD Limit | LCS Qual | LCSD Qual |
| Salinity | 103 | 103 | 90 - 110 | 0 | 10 | | |

## Duplicate - Batch: 660-91136

**Method: SM 2520B**
**Preparation: N/A**

Lab Sample ID: 660-33886-N-7 DU
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/25/2010 1200
Date Prepared: N/A

Analysis Batch: 660-91136
Prep Batch: N/A
Units: ppt

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 100 mL

| Analyte | Sample Result/Qual | | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|---|
| Salinity | 2.0 | U | 2.0 | NC | 10 | U |

## Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

### Method Blank - Batch: 660-91018

**Method: SM 2540D**
**Preparation: N/A**

Lab Sample ID: MB 660-91018/1
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/24/2010 0847
Date Prepared: N/A

Analysis Batch: 660-91018
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 250 mL
Final Weight/Volume: 250 mL

| Analyte | Result | Qual | PQL | PQL |
|---|---|---|---|---|
| Total Suspended Solids | 1.0 | U | 1.0 | 1.0 |

### Lab Control Sample - Batch: 660-91018

**Method: SM 2540D**
**Preparation: N/A**

Lab Sample ID: LCS 660-91018/2
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/24/2010 0847
Date Prepared: N/A

Analysis Batch: 660-91018
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 250 mL
Final Weight/Volume: 250 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Total Suspended Solids | 100 | 92.8 | 93 | 80 - 120 | |

### Duplicate - Batch: 660-91018

**Method: SM 2540D**
**Preparation: N/A**

Lab Sample ID: 660-33892-A-4 DU
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/24/2010 0847
Date Prepared: N/A

Analysis Batch: 660-91018
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 250 mL
Final Weight/Volume: 250 mL

| Analyte | Sample Result/Qual | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|
| Total Suspended Solids | 3.6 | 3.60 | 0 | 20 | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

## Method Blank - Batch: 660-91434

**Method: SM 426C**
**Preparation: N/A**

Lab Sample ID: MB 660-91434/12
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/04/2010 1100
Date Prepared: N/A

Analysis Batch: 660-91434
Prep Batch: N/A
Units: mg/L

Instrument ID: Turbidity
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Sulfate | 2.0 | U | 2.0 | 5.0 |

## Lab Control Sample - Batch: 660-91434

**Method: SM 426C**
**Preparation: N/A**

Lab Sample ID: LCS 660-91434/13
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 03/04/2010 1100
Date Prepared: N/A

Analysis Batch: 660-91434
Prep Batch: N/A
Units: mg/L

Instrument ID: Turbidity
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Sulfate | 10.0 | 10.2 | 102 | 75 - 125 | |

## Matrix Spike/ Matrix Spike Duplicate Recovery Report - Batch: 660-91434

**Method: SM 426C**
**Preparation: N/A**

MS Lab Sample ID: 660-33914-2
Client Matrix: Water
Dilution: 5.0
Date Analyzed: 03/04/2010 1100
Date Prepared: N/A

Analysis Batch: 660-91434
Prep Batch: N/A

Instrument ID: Turbidity
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

MSD Lab Sample ID: 660-33914-2
Client Matrix: Water
Dilution: 5.0
Date Analyzed: 03/04/2010 1100
Date Prepared: N/A

Analysis Batch: 660-91434
Prep Batch: N/A

Instrument ID: Turbidity
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Sulfate | 121 | 106 | 75 - 125 | 5 | 30 | | |

### Method Blank - Batch: 660-91210

**Method: SM 4500 Cl- E**
**Preparation: N/A**

Lab Sample ID: MB 660-91210/3
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/27/2010 0946
Date Prepared: N/A

Analysis Batch: 660-91210
Prep Batch: N/A
Units: mg/L

Instrument ID: SEAL1
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 2 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Chloride | 3.0 | U | 3.0 | 5.0 |

### Lab Control Sample - Batch: 660-91210

**Method: SM 4500 Cl- E**
**Preparation: N/A**

Lab Sample ID: LCS 660-91210/4
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/27/2010 0946
Date Prepared: N/A

Analysis Batch: 660-91210
Prep Batch: N/A
Units: mg/L

Instrument ID: SEAL1
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 2 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Chloride | 25.0 | 25.0 | 100 | 90 - 110 | |

### Matrix Spike/ Matrix Spike Duplicate Recovery Report - Batch: 660-91210

**Method: SM 4500 Cl- E**
**Preparation: N/A**

MS Lab Sample ID: 660-33863-M-7 MS
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/27/2010 0946
Date Prepared: N/A

Analysis Batch: 660-91210
Prep Batch: N/A

Instrument ID: SEAL1
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 2 mL

MSD Lab Sample ID: 660-33863-M-7 MSD
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/27/2010 0946
Date Prepared: N/A

Analysis Batch: 660-91210
Prep Batch: N/A

Instrument ID: SEAL1
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 2 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Chloride | 95 | 91 | 90 - 110 | 0 | 30 | | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

## Method Blank - Batch: 660-91342

**Method: SM 4500 P E**
**Preparation: N/A**

Lab Sample ID: MB 660-91341/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/02/2010 1600
Date Prepared: N/A
Date Leached: 03/01/2010 1600

Analysis Batch: 660-91342
Prep Batch: N/A
Units: mg/L
Leachate Batch: 660-91341

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 50 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Orthophosphate-Soluble | 0.75 | U | 0.75 | 3.0 |

## Lab Control Sample - Batch: 660-91342

**Method: SM 4500 P E**
**Preparation: N/A**

Lab Sample ID: LCS 660-91341/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/02/2010 1600
Date Prepared: N/A
Date Leached: 03/01/2010 1600

Analysis Batch: 660-91342
Prep Batch: N/A
Units: mg/L
Leachate Batch: 660-91341

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 50 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Orthophosphate-Soluble | 3.00 | 3.07 | 102 | 90 - 110 | |

## Matrix Spike/
## Matrix Spike Duplicate Recovery Report - Batch: 660-91342

**Method: SM 4500 P E**
**Preparation: N/A**

MS Lab Sample ID: 660-33914-8
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/02/2010 1600
Date Prepared: N/A
Date Leached: 03/01/2010 1600

Analysis Batch: 660-91342
Prep Batch: N/A
Leachate Batch: 660-91341

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 50 mL

MSD Lab Sample ID: 660-33914-8
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 03/02/2010 1600
Date Prepared: N/A
Date Leached: 03/01/2010 1600

Analysis Batch: 660-91342
Prep Batch: N/A
Leachate Batch: 660-91341

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 50 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Orthophosphate-Soluble | 92 | 91 | 90 - 110 | 1 | 30 | | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

## Method Blank - Batch: 660-90921

**Method: SM 4500 S2 F**
**Preparation: N/A**

Lab Sample ID: MB 660-90921/1
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/20/2010 1400
Date Prepared: N/A

Analysis Batch: 660-90921
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 250 mL

| Analyte | Result | Qual | PQL | PQL |
|---|---|---|---|---|
| Sulfide | 1.0 | U | 1.0 | 1.0 |

## Lab Control Sample/ Lab Control Sample Duplicate Recovery Report - Batch: 660-90921

**Method: SM 4500 S2 F**
**Preparation: N/A**

LCS Lab Sample ID: LCS 660-90921/2
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/20/2010 1400
Date Prepared: N/A

Analysis Batch: 660-90921
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 250 mL

LCSD Lab Sample ID: LCSD 660-90921/3
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/20/2010 1400
Date Prepared: N/A

Analysis Batch: 660-90921
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 1.0 mL
Final Weight/Volume: 250 mL

|  | % Rec. |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|
| Analyte | LCS | LCSD | Limit | RPD | RPD Limit | LCS Qual | LCSD Qual |
| Sulfide | 90 | 88 | 75 - 125 | 3 | 25 |  |  |

**Matrix Spike/**
**Matrix Spike Duplicate Recovery Report - Batch: 660-90921**

**Method: SM 4500 S2 F**
**Preparation: N/A**

| | | | | | |
|---|---|---|---|---|---|
| MS Lab Sample ID: | 640-26232-E-1 MS | Analysis Batch: | 660-90921 | Instrument ID: | No Equipment Assigned |
| Client Matrix: | Water | Prep Batch: | N/A | Lab File ID: | N/A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 1.0 mL |
| Date Analyzed: | 02/20/2010 1400 | | | Final Weight/Volume: | 250 mL |
| Date Prepared: | N/A | | | | |

| | | | | | |
|---|---|---|---|---|---|
| MSD Lab Sample ID: | 640-26232-E-1 MSD | Analysis Batch: | 660-90921 | Instrument ID: | No Equipment Assigned |
| Client Matrix: | Water | Prep Batch: | N/A | Lab File ID: | N/A |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 1.0 mL |
| Date Analyzed: | 02/20/2010 1400 | | | Final Weight/Volume: | 250 mL |
| Date Prepared: | N/A | | | | |

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Sulfide | 84 | 86 | 75 - 125 | 2 | 25 | | |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Method Blank - Batch: 660-91051**

**Method: SM 5220D**
**Preparation: SM 5220**

Lab Sample ID: MB 660-91051/3-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/24/2010 1413
Date Prepared: 02/24/2010 1113

Analysis Batch: 660-91052
Prep Batch: 660-91051
Units: mg/L

Instrument ID: HACH
Lab File ID: N/A
Initial Weight/Volume: 2 mL
Final Weight/Volume: 2 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Chemical Oxygen Demand | 10 | U | 10 | 20 |

**Lab Control Sample - Batch: 660-91051**

**Method: SM 5220D**
**Preparation: SM 5220**

Lab Sample ID: LCS 660-91051/4-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/24/2010 1413
Date Prepared: 02/24/2010 1113

Analysis Batch: 660-91052
Prep Batch: 660-91051
Units: mg/L

Instrument ID: HACH
Lab File ID: N/A
Initial Weight/Volume: 2 mL
Final Weight/Volume: 2 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Chemical Oxygen Demand | 50.0 | 52.6 | 105 | 90 - 110 | |

**Matrix Spike/**
**Matrix Spike Duplicate Recovery Report - Batch: 660-91051**

**Method: SM 5220D**
**Preparation: SM 5220**

MS Lab Sample ID: 660-33914-4
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/24/2010 1413
Date Prepared: 02/24/2010 1113

Analysis Batch: 660-91052
Prep Batch: 660-91051

Instrument ID: HACH
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

MSD Lab Sample ID: 660-33914-4
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/24/2010 1413
Date Prepared: 02/24/2010 1113

Analysis Batch: 660-91052
Prep Batch: 660-91051

Instrument ID: HACH
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Chemical Oxygen Demand | 88 | 80 | 90 - 110 | 4 | 20 | J3 | J3 |

# Quality Control Results

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

## Method Blank - Batch: 660-91053

**Method: SM 5220D**
**Preparation: SM 5220**

Lab Sample ID: MB 660-91053/3-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/24/2010 1445
Date Prepared: 02/24/2010 1113

Analysis Batch: 660-91054
Prep Batch: 660-91053
Units: mg/L

Instrument ID: HACH
Lab File ID: N/A
Initial Weight/Volume: 2 mL
Final Weight/Volume: 2 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Chemical Oxygen Demand | 10 | U | 10 | 20 |

## Lab Control Sample - Batch: 660-91053

**Method: SM 5220D**
**Preparation: SM 5220**

Lab Sample ID: LCS 660-91053/4-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/24/2010 1445
Date Prepared: 02/24/2010 1113

Analysis Batch: 660-91054
Prep Batch: 660-91053
Units: mg/L

Instrument ID: HACH
Lab File ID: N/A
Initial Weight/Volume: 2 mL
Final Weight/Volume: 2 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Chemical Oxygen Demand | 100 | 102 | 102 | 90 - 110 | |

## Matrix Spike/ Matrix Spike Duplicate Recovery Report - Batch: 660-91053

**Method: SM 5220D**
**Preparation: SM 5220**

MS Lab Sample ID: 660-33914-1
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/24/2010 1445
Date Prepared: 02/24/2010 1113

Analysis Batch: 660-91054
Prep Batch: 660-91053

Instrument ID: HACH
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

MSD Lab Sample ID: 660-33914-1
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/24/2010 1445
Date Prepared: 02/24/2010 1113

Analysis Batch: 660-91054
Prep Batch: 660-91053

Instrument ID: HACH
Lab File ID: N/A
Initial Weight/Volume: 25 mL
Final Weight/Volume: 25 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Chemical Oxygen Demand | 4 | -23 | 90 - 110 | 6 | 20 | J3 | J3 |

**Method Blank - Batch: 680-161926**

**Method: SM 5550B**
**Preparation: N/A**

Lab Sample ID: MB 680-161926/1
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/26/2010 1749
Date Prepared: N/A

Analysis Batch: 680-161926
Prep Batch: N/A
Units: mg/L

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 2 mL
Final Weight/Volume: 2 mL

| Analyte | Result | Qual | MDL | PQL |
|---|---|---|---|---|
| Tannins and Lignins | 0.037 | U | 0.037 | 0.10 |

**Lab Control Sample - Batch: 680-161926**

**Method: SM 5550B**
**Preparation: N/A**

Lab Sample ID: LCS 680-161926/2
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 02/26/2010 1749
Date Prepared: N/A

Analysis Batch: 680-161926
Prep Batch: N/A
Units: mg/L

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 2 mL
Final Weight/Volume: 2 mL

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Tannins and Lignins | 1.00 | 1.06 | 106 | 80 - 120 | |

**Matrix Spike/**
**Matrix Spike Duplicate Recovery Report - Batch: 680-161926**

**Method: SM 5550B**
**Preparation: N/A**

MS Lab Sample ID: 400-45770-A-3 MS
Client Matrix: Water
Dilution: 10
Date Analyzed: 02/26/2010 1752
Date Prepared: N/A

Analysis Batch: 680-161926
Prep Batch: N/A

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10 mL

MSD Lab Sample ID: 400-45770-A-3 MSD
Client Matrix: Water
Dilution: 10
Date Analyzed: 02/26/2010 1752
Date Prepared: N/A

Analysis Batch: 680-161926
Prep Batch: N/A

Instrument ID: KONELAB1
Lab File ID: N/A
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10 mL

| | % Rec. | | | | | | |
|---|---|---|---|---|---|---|---|
| Analyte | MS | MSD | Limit | RPD | RPD Limit | MS Qual | MSD Qual |
| Tannins and Lignins | -213 | -288 | 80 - 120 | 4 | 20 | J3 | J3 |

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2960 Foster Creighton Road Nashville, TN 37204 * 800-765-0980 * Fax 615-726-3404

2/26/2010 9:22:33AM

Client: TestAmerica Tampa
6712 Benjamin Road, Suite 100
Tampa, FL 33634

Attn: Nancy Robertson

Work Order: NTB1555
Project Name: GHNS Barbados
Project Number: 660-33914
Date Received: 02/19/10

| SAMPLE IDENTIFICATION | LAB NUMBER | COLLECTION DATE AND TIME |
|---|---|---|
| 4F | NTB1555-01 | 02/17/10 09:30 |
| 4E | NTB1555-02 | 02/17/10 10:30 |
| 4C | NTB1555-03 | 02/17/10 11:20 |
| 10 | NTB1555-04 | 02/17/10 12:30 |
| 7A | NTB1555-05 | 02/17/10 13:50 |
| 7B | NTB1555-06 | 02/17/10 14:30 |
| Surface Water Blank | NTB1555-07 | 02/17/10 09:00 |

Samples were received into laboratory at a temperature of 0.60 °C.

Comments:

An executed copy of the chain of custody, the project quality control data, and the sample receipt form are also included as an addendum to this report. If you have any questions relating to this analytical report, please contact your Laboratory Project Manager. Any opinions, if expressed, are outside the scope of the Laboratory's accreditation.

Results are reported on a wet weight basis unless otherwise noted

The reported results were obtained in compliance with 2003 NELAC standards unless otherwise noted.

These results relate only to the items tested

Estimated uncertainty is available upon request.

Florida Certification Number: E87358

This report has been electronically signed.

Approved By:

Judith A Beato

**TestAmerica Nashville**
Judith A Beato
Project Manager

Client: TestAmerica Tampa
6712 Benjamin Road, Suite 100
Tampa, FL 33634
Attn: Nancy Robertson

Work Order: NTB1555
Project: GHNS Barbados
Project Number: 660-33914

Sampled: 02/17/10
Received: 02/19/10

## LABORATORY REPORT
### Sample ID: 4F - Lab Number: NTB1555-01 - Matrix: Water

| CAS # | Analyte | Result | Q | Units | MDL | PQL | Dil Factor | Analyzed Date/Time | By | Method | Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | | | | | |
| BOD | **BOD - 5 Day** | **88.8** | Q | mg/L | 2.00 | 2.00 | 1 | 02/24/10 08:35 | SXJ | SM 5210B | 10B3335 |
| | | | | | | | | Prep Date: 02/19/10 13:42 | | | |
| NA | **Chlorophyll-a Uncorrected** | **98.9** | Q | ug/L | 2.00 | 2.00 | 1 | 02/25/10 09:26 | SXJ | SM 10200H | 10B4160 |
| | | | | | | | | Filtered Date: 02/19/10 14:04 | | | |

## LABORATORY REPORT
### Sample ID: 4E - Lab Number: NTB1555-02 - Matrix: Water

| CAS # | Analyte | Result | Q | Units | MDL | PQL | Dil Factor | Analyzed Date/Time | By | Method | Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | | | | | |
| BOD | **BOD - 5 Day** | **3.60** | Q | mg/L | 2.00 | 2.00 | 1 | 02/24/10 08:35 | SXJ | SM 5210B | 10B3335 |
| | | | | | | | | Prep Date: 02/19/10 13:42 | | | |
| NA | **Chlorophyll-a Uncorrected** | **3.20** | Q | ug/L | 2.00 | 2.00 | 1 | 02/25/10 09:28 | SXJ | SM 10200H | 10B4160 |
| | | | | | | | | Filtered Date: 02/19/10 13:34 | | | |

## LABORATORY REPORT
### Sample ID: 4C - Lab Number: NTB1555-03 - Matrix: Water

| CAS # | Analyte | Result | Q | Units | MDL | PQL | Dil Factor | Analyzed Date/Time | By | Method | Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | | | | | |
| BOD | **BOD - 5 Day** | **10.3** | Q | mg/L | 2.00 | 2.00 | 1 | 02/24/10 08:35 | SXJ | SM 5210B | 10B3335 |
| | | | | | | | | Prep Date: 02/19/10 13:42 | | | |
| NA | **Chlorophyll-a Uncorrected** | **91.8** | Q | ug/L | 2.00 | 2.00 | 1 | 02/25/10 09:29 | SXJ | SM 10200H | 10B4160 |
| | | | | | | | | Filtered Date: 02/19/10 14:33 | | | |

## LABORATORY REPORT
### Sample ID: 10 - Lab Number: NTB1555-04 - Matrix: Water

| CAS # | Analyte | Result | Q | Units | MDL | PQL | Dil Factor | Analyzed Date/Time | By | Method | Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | | | | | |
| BOD | **BOD - 5 Day** | **2.95** | Q | mg/L | 2.00 | 2.00 | 1 | 02/24/10 08:35 | SXJ | SM 5210B | 10B3335 |
| | | | | | | | | Prep Date: 02/19/10 13:42 | | | |
| NA | **Chlorophyll-a Uncorrected** | **15.0** | Q | ug/L | 2.00 | 2.00 | 1 | 02/25/10 09:30 | SXJ | SM 10200H | 10B4160 |
| | | | | | | | | Filtered Date: 02/19/10 13:38 | | | |

## LABORATORY REPORT
### Sample ID: 7A - Lab Number: NTB1555-05 - Matrix: Water

| CAS # | Analyte | Result | Q | Units | MDL | PQL | Dil Factor | Analyzed Date/Time | By | Method | Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | | | | | |
| BOD | **BOD - 5 Day** | **4.20** | | mg/L | 2.00 | 2.00 | 1 | 02/24/10 08:35 | SXJ | SM 5210B | 10B3335 |
| | | | | | | | | Prep Date: 02/19/10 13:42 | | | |

**TestAmerica Nashville**
Judith A Beato
Project Manager

Client: TestAmerica Tampa
6712 Benjamin Road, Suite 100
Tampa, FL 33634
Attn: Nancy Robertson

Work Order: NTB1555
Project: GHNS Barbados
Project Number: 660-33914

Sampled: 02/17/10
Received: 02/19/10

## LABORATORY REPORT
### Sample ID: 7A - Lab Number: NTB1555-05 - Matrix: Water

| CAS # | Analyte | Result | Q | Units | MDL | PQL | Dil Factor | Analyzed Date/Time | By | Method | Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters - Cont.** | | | | | | | | | | | |
| NA | **Chlorophyll-a Uncorrected** | **37.2** | | ug/L | 2.00 | 2.00 | 1 | 02/25/10 09:31 | SXJ | SM 10200H | 10B4160 |
| | | | | | | | | Filtered Date: 02/19/10 13:20 | | | |

## LABORATORY REPORT
### Sample ID: 7B - Lab Number: NTB1555-06 - Matrix: Water

| CAS # | Analyte | Result | Q | Units | MDL | PQL | Dil Factor | Analyzed Date/Time | By | Method | Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | | | | | |
| BOD | **BOD - 5 Day** | **3.93** | | mg/L | 2.00 | 2.00 | 1 | 02/24/10 08:35 | SXJ | SM 5210B | 10B3335 |
| | | | | | | | | Prep Date: 02/19/10 13:42 | | | |
| NA | **Chlorophyll-a Uncorrected** | **24.2** | | ug/L | 2.00 | 2.00 | 1 | 02/25/10 09:33 | SXJ | SM 10200H | 10B4160 |
| | | | | | | | | Filtered Date: 02/19/10 13:24 | | | |

## LABORATORY REPORT
### Sample ID: Surface Water Blank - Lab Number: NTB1555-07 - Matrix: Water

| CAS # | Analyte | Result | Q | Units | MDL | PQL | Dil Factor | Analyzed Date/Time | By | Method | Batch |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | | | | | |
| BOD | BOD - 5 Day | 2.00 | Q,U | mg/L | 2.00 | 2.00 | 1 | 02/24/10 08:35 | SXJ | SM 5210B | 10B3335 |
| | | | | | | | | Prep Date: 02/19/10 13:42 | | | |
| NA | Chlorophyll-a Uncorrected | 2.00 | Q,U | ug/L | 2.00 | 2.00 | 1 | 02/25/10 09:34 | SXJ | SM 10200H | 10B4160 |
| | | | | | | | | Filtered Date: 02/19/10 13:41 | | | |

Client: TestAmerica Tampa
6712 Benjamin Road, Suite 100
Tampa, FL 33634
Attn: Nancy Robertson

Work Order: NTB1555
Project: GHNS Barbados
Project Number: 660-33914

Sampled: 02/17/10
Received: 02/19/10

## SAMPLE EXTRACTION DATA

| Parameter | Lab Number | Wt/Vol Extracted | Extracted Vol | Date | Analyst | Method |
|---|---|---|---|---|---|---|
| General Chemistry Parameters | NTB1555-01 | 300.0 mL | 300.0 mL | 02/19/2010 | SXJ | *** DEFAULT PREI |
| General Chemistry Parameters | NTB1555-02 | 300.0 mL | 300.0 mL | 02/19/2010 | SXJ | *** DEFAULT PREI |
| General Chemistry Parameters | NTB1555-03 | 300.0 mL | 300.0 mL | 02/19/2010 | SXJ | *** DEFAULT PREI |
| General Chemistry Parameters | NTB1555-04 | 300.0 mL | 300.0 mL | 02/19/2010 | SXJ | *** DEFAULT PREI |
| General Chemistry Parameters | NTB1555-05 | 300.0 mL | 300.0 mL | 02/19/2010 | SXJ | *** DEFAULT PREI |
| General Chemistry Parameters | NTB1555-06 | 300.0 mL | 300.0 mL | 02/19/2010 | SXJ | *** DEFAULT PREI |
| General Chemistry Parameters | NTB1555-07 | 300.0 mL | 300.0 mL | 02/19/2010 | SXJ | *** DEFAULT PREI |
| General Chemistry Parameters | NTB1555-01 | 1.0 filter | 1.0 filter | 02/19/2010 | SXJ | Filtering |
| General Chemistry Parameters | NTB1555-02 | 1.0 filter | 1.0 filter | 02/19/2010 | SXJ | Filtering |
| General Chemistry Parameters | NTB1555-03 | 1.0 filter | 1.0 filter | 02/19/2010 | SXJ | Filtering |
| General Chemistry Parameters | NTB1555-04 | 1.0 filter | 1.0 filter | 02/19/2010 | SXJ | Filtering |
| General Chemistry Parameters | NTB1555-05 | 1.0 filter | 1.0 filter | 02/19/2010 | SXJ | Filtering |
| General Chemistry Parameters | NTB1555-06 | 1.0 filter | 1.0 filter | 02/19/2010 | SXJ | Filtering |
| General Chemistry Parameters | NTB1555-07 | 1.0 filter | 1.0 filter | 02/19/2010 | SXJ | Filtering |

| | | | | | |
|---|---|---|---|---|---|
| Client: | TestAmerica Tampa<br>6712 Benjamin Road, Suite 100<br>Tampa, FL 33634 | Work Order:<br>Project:<br>Project Number: | NTB1555<br>GHNS Barbados<br>660-33914 | Sampled:<br>Received: | 02/17/10<br>02/19/10 |
| Attn: | Nancy Robertson | | | | |

## PROJECT QUALITY CONTROL DATA
### Blank

| Analyte | Blank Value | Q | Units | Q.C. Batch | Lab Number |
|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | |
| BOD - 5 Day | 2.00 | | mg/L | 10B3335 | 10B3335-BLK1 |
| Chlorophyll-a Uncorrected | 2.00 | U | ug/L | 10B4160 | 10B4160-BLK1 |

## PROJECT QUALITY CONTROL DATA
### Duplicate

| Analyte | Orig. Val. | Duplicate | Q | Units | RPD | RPD Limit | Q.C. Batch | Sample Duplicated |
|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | | |
| BOD - 5 Day | <2.00 | 2.00 | | mg/L | | 20 | 10B3335 | NTB1443-06 |
| Chlorophyll-a Uncorrected | 37.2 | 38.1 | | ug/L | 2 | 50 | 10B4160 | NTB1555-05 |

## PROJECT QUALITY CONTROL DATA
### LCS

| Analyte | Known Val. | Analyzed Val | Q | Units | % Rec. | Target Range | Q.C. Batch |
|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | |
| BOD - 5 Day | 198 | 208 | | mg/L | 105 | 85 - 115 | 10B3335 |
| Chlorophyll-a Uncorrected | 200 | 176 | | ug/L | 88 | 80 - 120 | 10B4160 |

## PROJECT QUALITY CONTROL DATA
### LCS Dup

| Analyte | Orig. Val. | Duplicate | Q | Units | Spike Conc | % Rec. | RPD | RPD Limit | Q.C. Batch | Sample Duplicated |
|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry Parameters** | | | | | | | | | | |
| Chlorophyll-a Uncorrected | | 177 | | ug/L | 200 | 89 | 0.8 | 50 | 10B4160 | |

**TestAmerica Nashville**
Judith A Beato
Project Manager

| | | | | | |
|---|---|---|---|---|---|
| Client: | TestAmerica Tampa<br>6712 Benjamin Road, Suite 100<br>Tampa, FL 33634 | Work Order: | NTB1555 | Sampled: | 02/17/10 |
| | | Project: | GHNS Barbados | Received: | 02/19/10 |
| | | Project Number: | 660-33914 | | |
| Attn: | Nancy Robertson | | | | |

## CERTIFICATION SUMMARY

**TestAmerica Nashville**

| Method | Matrix | A2LA | AIHA | Nelac | Florida |
|---|---|---|---|---|---|
| SM 10200H | Water | | | X | X |
| SM 5210B | Water | | N/A | X | X |

**Subcontracted Laboratories**

TestAmerica - Orlando, FL Florida Cert #E83012

8010 Sunport Drive Suite 116 - Orlando, FL 32809

Analysis Performed: BOD 5 Day SM 5210B

Samples: NTB1555-01, NTB1555-02, NTB1555-03, NTB1555-04, NTB1555-05, NTB1555-06, NTB1555-07

Analysis Performed: Chlorophyll-a Uncorrected SM10200H

Samples: NTB1555-01, NTB1555-02, NTB1555-03, NTB1555-04, NTB1555-05, NTB1555-06, NTB1555-07

## DATA QUALIFIERS AND DEFINITIONS

| | |
|---|---|
| **Q** | Sample analyzed beyond acceptable holding time. |
| **U** | The compound was analyzed for but not detected |

## ADDITIONAL COMMENTS

When insufficient sample volume is received for Matrix Spike and Matrix Spike Duplicate, Laboratory Control Spike and Laboratory Control Spike Duplicate data is used for batch QC.

**TestAmerica Nashville**
Judith A Beato
Project Manager

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
4310 East Anderson Road * Orlando, FL 32812 * 407-851-2560 * Fax: 407-856-0886 * 800-851-

Client: TestAmerica Tampa

Project: NTB1555

Shipped By: Walk-in

Tracking Number:

Cooler Received On: 02/19/10 12:35

And Opened On (Date/time): 2-19-10/1235

Received By: Schineidyne Joseph

Logged in by: Ryan Reich

Were custody seals on the outside of cooler? **YES** ___ **NO** √ If Yes # ___ Location ___

Were custody seals intact? **YES** ___ **NO** ___ **N/A** √ (no seals present)

Chain of Custody Complete? **YES** √ **NO** ___

Discrepancy Comments:

Cooler Temparture When Opened: 0.60 Degrees Celsius

Temparture Blank Included: **YES** ___ **NO** √

Packing Material: Bubblewrap ___ NONE ___ [✓ Other:] Plastic

Received on Ice: **YES** √ **NO** ___ Other: ___ Total # Of Containers: 14 # Vials ___

Any Bottles Broken? **YES** ___ **NO** √ If Yes Which One(s)? ___

Any Missing Samples? **YES** ___ **NO** √ If Yes Which One(s)? ___

pH Levels: H2SO4 <=2? ___ HNO3 <=2? ___ HCL <=2? ___ NaOH >=10? ___

# Of Containers Unpreserved between 6 and 8? 14

Any Air Bubbles in VOA Vials? **YES** ___ **NO** ___ **N/A** √ (no VOA vials received)

Was there enough sample shipped in each container? **YES** ✓ **NO** ~~√~~ RR 2-19-10

Correct Preservatives Used? **YES** √ **NO** ___ If No, see comments:

Project Manager: Judith A Beato

Corrective Actions Taken

Serial Number NTB1555

## ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

☒ **TestAmerica Tampa**
6712 Benjamin Road, Suite 100
Tampa, FL 33634

Website: www.testamericainc.com
Phone: (813) 885-7427
Fax: (813) 885-7049

○ Alternate Laboratory Name/Location
Phone:
Fax:

PROJECT REFERENCE GHNS
PROJECT NO. 2010001
PROJECT LOCATION (STATE) Barbados
SAMPLER'S SIGNATURE
P.O. NUMBER
CONTRACT NO.
CLIENT (SITE) PM EEC- R. Pryor
CLIENT PHONE 813-237-3781
CLIENT FAX
CLIENT NAME EEC
CLIENT E-MAIL barbados@eec-tampabay.com
CLIENT ADDRESS Tampa FL
COMPANY CONTRACTING THIS WORK (if applicable)

PAGE 1 OF 2
STANDARD REPORT DELIVERY ☒
DATE DUE
EXPEDITED REPORT DELIVERY (SURCHARGE) ○
DATE DUE
NUMBER OF COOLERS SUBMITTED PER SHIPMENT:

REQUIRED ANALYSIS — PRESERVATIVE — NUMBER OF CONTAINERS SUBMITTED

| SAMPLE DATE | SAMPLE TIME | SAMPLE IDENTIFICATION | COMPOSITE (C) OR GRAB (G) INDICATE | AQUEOUS (WATER) | SOLID OR SEMISOLID | AIR | NONAQUEOUS LIQUID (OIL, SOLVENT....) | CO2 | COD | Sulfide | TSS, Turbidity | BOD | Herb. | Organophos Pest | Phosphoros total | MG, NA, CU, FE, PB, K; Mercury | chlor. Pest | Tannins Lignins | Chlorophyl | Nitrate, Nitrite, Salinity, Sulfate, Alkalinity, Chloride | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2/17/10 | 9:30 | 4F | | X | | | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 01 |
| 2/17/10 | 10:30 | 4E | | X | | | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 02 |
| 2/17/10 | 11:20 | 4C | | X | | | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 03 |
| 2/17/10 | 12:30 | 10 | | X | | | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 04 |
| 2/17/10 | ~~1~~1:50 | 7A 1:50 | | X | | | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 05 |
| 2/17/10 | 2:30 | 7B | | X | | | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 06 |
| 2/17/10 | 9:00 AM | Surface Water Blank | | X | | | | 2 | 1 | 1 | * | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 07 |

* Bottle Broken- tests added to ~~[illegible]~~ another 1L bottle
** Add Turbidity

| RELINQUISHED BY: (SIGNATURE) | DATE | TIME | RELINQUISHED BY: (SIGNATURE) | DATE | TIME | RELINQUISHED BY: (SIGNATURE) | DATE | TIME |
|---|---|---|---|---|---|---|---|---|
| EMPTY CONTAINERS | | | | 2/17/10 | 9:00 | Barbara Pryor | 2/17/10 | 4:00 |
| **RECEIVED BY: (SIGNATURE)** | **DATE** | **TIME** | **RECEIVED BY: (SIGNATURE)** | **DATE** | **TIME** | **RECEIVED BY: (SIGNATURE)** | **DATE** | **TIME** |
| EMPTY CONTAINERS | 2/10/10 | 2:00PM | Barbara Pryor | 2/17/10 | 9:00 | Schneider | 2-19-10 | 12:35 |

LABORATORY USE ONLY

| RECEIVED FOR LABORATORY BY: (SIGNATURE) | DATE | TIME | CUSTODY INTACT | CUSTODY SEAL NO. | TAMPA LOG NO. | COOLER TEMP. UPON RECEIPT | LABORATORY REMARKS |
|---|---|---|---|---|---|---|---|
| | | | YES ○<br>NO ○ | | | 0.6 | |

TAL8240-660 (0209)

Serial Number

# ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

660-33914

☒ **TestAmerica Tampa**
6712 Benjamin Road, Suite 100
Tampa, FL 33634

Website: www.testamericainc.com
Phone: (813) 885-7427
Fax: (813) 885-7049

○ Alternate Laboratory Name/Location
Phone:
Fax:

PROJECT REFERENCE: GHNS
PROJECT NO.: 2010001
PROJECT LOCATION (STATE): Barbados
SAMPLER'S SIGNATURE:
P.O. NUMBER:
CONTRACT NO.:
CLIENT (SITE) PM: EEC - R. Pryor
CLIENT PHONE: 813-237-3781
CLIENT FAX:
CLIENT NAME: EEC
CLIENT E-MAIL: barbados@eec-tampabay.com
CLIENT ADDRESS: Tampa FL
COMPANY CONTRACTING THIS WORK (if applicable):

PAGE 1 OF 2
STANDARD REPORT DELIVERY ☒
DATE DUE ____
EXPEDITED REPORT DELIVERY (SURCHARGE) ○
DATE DUE ____
NUMBER OF COOLERS SUBMITTED PER SHIPMENT:

PRESERVATIVE: TSS, Turbidity **

| SAMPLE DATE | SAMPLE TIME | SAMPLE IDENTIFICATION | COMPOSITE (C) OR GRAB (G) INDICATE | AQUEOUS (WATER) | SOLID OR SEMISOLID | AIR | NONAQUEOUS LIQUID (OIL, SOLVENT....) | CO2 | COD | Sulfide | TSS, Turbidity | BOD | Herb. | Organophos Pest | Phosphoros Total | MG, NA, CU, FE PB, K; Mercory | Chlor. Pest | Tannins Lignins | Chlorophyl | Nitrate Nitrite, Salinity Sulfate Alkalinity Chloride | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2/17/10 | 9:30 | 4F | | X | | | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 2/17/10 | 10:30 | 4E | | X | | | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 2/17/10 | 11:20 | 4C | | X | | | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 2/17/10 | 12:30 | 10 | | X | | | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 2/17/10 | ~~1~~1:50 | 7A 1:50 | | X | | | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 2/17/10 | 2:30 | 7B | | X | | | | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 2/17/10 | 9:00 AM | Surface Water Blank | | X | | | | 2 | 1 | 1 | * | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |

* Bottle Broken - tests added to [illegible] another 1L bottle
** Add Turbidity

| RELINQUISHED BY: (SIGNATURE) | DATE | TIME | RELINQUISHED BY: (SIGNATURE) | DATE | TIME | RELINQUISHED BY: (SIGNATURE) | DATE | TIME |
|---|---|---|---|---|---|---|---|---|
| EMPTY CONTAINERS | | | | 2/17/10 | 9:00 | Barbara Pryor | 2/17/10 | 4:00 |

| RECEIVED BY: (SIGNATURE) | DATE | TIME | RECEIVED BY: (SIGNATURE) | DATE | TIME | RECEIVED BY: (SIGNATURE) | DATE | TIME |
|---|---|---|---|---|---|---|---|---|
| EMPTY CONTAINERS | 2/10/10 | 2:00PM | Barbara Pryor | 2/17/10 | 9:00 | | | |

LABORATORY USE ONLY

| RECEIVED FOR LABORATORY BY: (SIGNATURE) | DATE | TIME | CUSTODY INTACT | CUSTODY SEAL NO. | TAMPA LOG NO. | COOLER TEMP. UPON RECEIPT | LABORATORY REMARKS |
|---|---|---|---|---|---|---|---|
| Amanda Dennison | 2/19/10 | 0850 | YES ○<br>NO ○ | | 660-33914 | 2.0, 1.5, 1.2, 2.3, 2.2, 0.2, 0.3, 1.7, ~~1~~ 1.0°C | CU-07 |

TAL8240-660 (0209)

Serial Number

## ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

660-33914

☒ **TestAmerica Tampa**
6712 Benjamin Road, Suite 100
Tampa, FL 33634

Website: www.testamericainc.com
Phone: (813) 885-7427
Fax: (813) 885-7049

○ Alternate Laboratory Name/Location
Phone:
Fax:

PROJECT REFERENCE GHNS
PROJECT NO. 2010001
PROJECT LOCATION (STATE) Barbados
SAMPLER'S SIGNATURE
P.O. NUMBER
CONTRACT NO.
CLIENT (SITE) PM EEC - R Pryor
CLIENT PHONE 813-237-3781
CLIENT FAX
CLIENT NAME EEC
CLIENT E-MAIL barbados@eec-tampabay.com
CLIENT ADDRESS Tampa FL
COMPANY CONTRACTING THIS WORK (if applicable)

PAGE 2 OF 2
STANDARD REPORT DELIVERY ☒
DATE DUE ________
EXPEDITED REPORT DELIVERY (SURCHARGE) ○
DATE DUE ________
NUMBER OF COOLERS SUBMITTED PER SHIPMENT:

| SAMPLE DATE | SAMPLE TIME | SAMPLE IDENTIFICATION | COMPOSITE (C) OR GRAB (G) INDICATE | AQUEOUS (WATER) | SOLID OR SEMISOLID | AIR | NONAQUEOUS LIQUID (OIL, SOLVENT....) | Chlor pest | ICP Metals Mercury | Nitrate Nitrite Sulphate, Orthophosphate | Sulfide; Phosphorus Ammonia | TOC | Herb | Organophos. Pest | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | PRESERVATIVE | | | | | | | | | |
| 2/17/10 | 9:40 | 4F | | | X | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | |
| 2/17/10 | 10:40 | 4E | | | X | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | |
| 2/17/10 | 12:50 | 10 | | | X | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | |
| 2/17/10 | 2:00 | 7A | | | X | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | |

MATRIX TYPE; REQUIRED ANALYSIS; NUMBER OF CONTAINERS SUBMITTED

| RELINQUISHED BY: (SIGNATURE) | DATE | TIME | RELINQUISHED BY: (SIGNATURE) | DATE | TIME | RELINQUISHED BY: (SIGNATURE) | DATE | TIME |
|---|---|---|---|---|---|---|---|---|
| EMPTY CONTAINERS | | | | 2/17/10 | 9:00 | Barbara Pryor | 2/17/10 | 4:00 |
| **RECEIVED BY: (SIGNATURE)** | **DATE** | **TIME** | **RECEIVED BY: (SIGNATURE)** | **DATE** | **TIME** | **RECEIVED BY: (SIGNATURE)** | **DATE** | **TIME** |
| EMPTY CONTAINERS | 2/10/10 | 2:00PM | Barbara Pryor | 2/17/10 | 9:00 | | | |

LABORATORY USE ONLY

| RECEIVED FOR LABORATORY BY: (SIGNATURE) | DATE | TIME | CUSTODY INTACT | CUSTODY SEAL NO. | TAMPA LOG NO. | COOLER TEMP. UPON RECEIPT | LABORATORY REMARKS |
|---|---|---|---|---|---|---|---|
| Amanda Hamilton | 2/19/10 | 0850 | YES ○<br>NO ○ | | 660-33914 | 2.0, 1.5, 2.2, ~~2~~ 2.3, 0 AH 2-19-10 | 2, 0.8, 1.7, ~~3~~ 1.0 °C CU07 |

TAL8240-660 (0209)

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

# PRESERVATION CONFIRMATION FORM

Tampa, FL

JOB NUMBER: 660-33914 Logged in TALS By: Amanda Harrison

Cooler Received on (date) 2/19/10 And Opened By (full name): Jason Fink

1. Shipper (circle one) IN [✓ FEDEX] UPS DHL WALK-IN COURIER OTHER:

2. Tracking #

3. Temperature of rep. sample or temp blank when opened: 2.0, 1.5, 1.2, 2.3, 2.2, 0.2, 0.8, 1.7, 1.0 Degrees Celsius CU.07

4. Number of H2SO4 (sulfuric acid) preserved containers: 14

All containers pH < 2 ? yes If not please comment below:

5. Number of HCL (hydrochloric acid) preserved containers:

All containers pH < 2 ? If not please comment below:

6. Number of HNO3 (nitric acid) preserved containers: 7

All containers pH < 2 ? NO If not please comment below:

4C pH=4

7. Number of NaOH (sodium hydroxide) preserved containers: ~~6~~ 7 AH 2-19-10

All containers pH >12 ? NO If not please comment below:

4F pH=10, 4E pH=10, 4C pH=10, 1D pH=10, 7A pH= 10,
7B pH=10

8. Number of Unpreserved containers: 56

All containers pH between 6 and 8? yes If not please comment below:

9. Was chlorine present in any of the unpreserved containers? NO

If yes, which samples?

pH Strip Lot#: 10B105 Chlorine Strip Lot#: 9259

FWI-CU-002:02.04.10:2

Revision 2- 02/04/10

# Login Sample Receipt Check List

Client: Environmental Engineering Consultant
Job Number: 660-33914-1

**Login Number: 33914**
**List Source: TestAmerica Tampa**
**Creator: Harrison, Amanda**
**List Number: 1**

| Question | T / F/ NA | Comment |
|---|---|---|
| Radioactivity either was not measured or, if measured, is at or below background | N/A | |
| The cooler's custody seal, if present, is intact. | True | |
| The cooler or samples do not appear to have been compromised or tampered with. | True | |
| Samples were received on ice. | True | |
| Cooler Temperature is acceptable. | True | |
| Cooler Temperature is recorded. | True | see recipet / info page |
| COC is present. | True | |
| COC is filled out in ink and legible. | True | |
| COC is filled out with all pertinent information. | True | |
| There are no discrepancies between the sample IDs on the containers and the COC. | True | |
| Samples are received within Holding Time. | True | minimal hold time for NO2,NO3,turb,bod, chl A-will analyze ASAP |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | |
| Sample collection date/times are provided. | True | |
| Appropriate sample containers are used. | True | |
| Sample bottles are completely filled. | True | |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs | False | minimal sample for Surface Water Blank |
| VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter. | N/A | |
| If necessary, staff have been informed of any short hold time or quick TAT needs | True | |
| Multiphasic samples are not present. | True | |
| Samples do not require splitting or compositing. | True | |
| Is the Field Sampler's name present on COC? | True | |
| Sample Preservation Verified | False | no preservation indicated on the COC |

# Login Sample Receipt Check List

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Login Number: 33914**
**Creator: Isbell, Glenn**
**List Number: 1**

**List Source: TestAmerica Mobile**
**List Creation: 02/23/10 03:49 PM**

| Question | T / F/ NA | Comment |
|---|---|---|
| Radioactivity either was not measured or, if measured, is at or below background | True | |
| The cooler's custody seal, if present, is intact. | N/A | |
| The cooler or samples do not appear to have been compromised or tampered with. | True | |
| Samples were received on ice. | True | |
| Cooler Temperature is acceptable. | True | |
| Cooler Temperature is recorded. | True | ..9 C LIA06 |
| COC is present. | True | |
| COC is filled out in ink and legible. | True | |
| COC is filled out with all pertinent information. | True | |
| There are no discrepancies between the sample IDs on the containers and the COC. | True | |
| Samples are received within Holding Time. | True | |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | |
| Sample collection date/times are provided. | True | |
| Appropriate sample containers are used. | True | |
| Sample bottles are completely filled. | True | |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs | True | |
| VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter. | True | |
| If necessary, staff have been informed of any short hold time or quick TAT needs | True | |
| Multiphasic samples are not present. | True | |
| Samples do not require splitting or compositing. | True | |
| Is the Field Sampler's name present on COC? | True | |
| Sample Preservation Verified | True | |

# Login Sample Receipt Check List

Client: Environmental Engineering Consultant
Job Number: 660-33914-1

**Login Number: 33914**
**Creator: Hor, Koma**
**List Number: 1**

**List Source: TestAmerica Pensacola**
**List Creation: 02/20/10 10:14 AM**

| Question | T / F/ NA | Comment |
|---|---|---|
| Radioactivity either was not measured or, if measured, is at or below background | N/A | |
| The cooler's custody seal, if present, is intact. | True | |
| The cooler or samples do not appear to have been compromised or tampered with. | True | |
| Samples were received on ice. | True | |
| Cooler Temperature is acceptable. | True | |
| Cooler Temperature is recorded. | True | 0.0°C |
| COC is present. | True | |
| COC is filled out in ink and legible. | True | |
| COC is filled out with all pertinent information. | True | |
| There are no discrepancies between the sample IDs on the containers and the COC. | True | |
| Samples are received within Holding Time. | True | |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | |
| Sample collection date/times are provided. | True | |
| Appropriate sample containers are used. | True | |
| Sample bottles are completely filled. | True | |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs | True | |
| VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter. | True | |
| If necessary, staff have been informed of any short hold time or quick TAT needs | True | |
| Multiphasic samples are not present. | True | |
| Samples do not require splitting or compositing. | True | |
| Is the Field Sampler's name present on COC? | True | |
| Sample Preservation Verified | True | |

# Login Sample Receipt Check List

Client: Environmental Engineering Consultant
Job Number: 660-33914-1

**Login Number: 33914**
**Creator: Conner, Keaton**
**List Number: 1**

**List Source: TestAmerica Savannah**
**List Creation: 02/20/10 08:44 AM**

| Question | T / F/ NA | Comment |
|---|---|---|
| Radioactivity either was not measured or, if measured, is at or below background | N/A | |
| The cooler's custody seal, if present, is intact. | True | |
| The cooler or samples do not appear to have been compromised or tampered with. | True | |
| Samples were received on ice. | True | |
| Cooler Temperature is acceptable. | True | |
| Cooler Temperature is recorded. | True | |
| COC is present. | True | |
| COC is filled out in ink and legible. | True | |
| COC is filled out with all pertinent information. | True | |
| There are no discrepancies between the sample IDs on the containers and the COC. | True | |
| Samples are received within Holding Time. | True | |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | |
| Sample collection date/times are provided. | True | |
| Appropriate sample containers are used. | True | |
| Sample bottles are completely filled. | True | |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs | True | |
| VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter. | N/A | |
| If necessary, staff have been informed of any short hold time or quick TAT needs | True | |
| Multiphasic samples are not present. | N/A | |
| Samples do not require splitting or compositing. | N/A | |
| Is the Field Sampler's name present on COC? | False | |
| Sample Preservation Verified | True | |

# Login Sample Receipt Check List

Client: Environmental Engineering Consultant

Job Number: 660-33914-1

**Login Number: 33914**
**Creator: Snead, Joshua**
**List Number: 1**

**List Source: TestAmerica Tallahassee**
**List Creation: 02/21/10 01:36 PM**

| Question | T / F/ NA | Comment |
|---|---|---|
| Radioactivity either was not measured or, if measured, is at or below background | N/A | |
| The cooler's custody seal, if present, is intact. | True | |
| The cooler or samples do not appear to have been compromised or tampered with. | True | |
| Samples were received on ice. | True | |
| Cooler Temperature is acceptable. | True | |
| Cooler Temperature is recorded. | True | |
| COC is present. | True | |
| COC is filled out in ink and legible. | True | |
| COC is filled out with all pertinent information. | True | |
| There are no discrepancies between the sample IDs on the containers and the COC. | True | |
| Samples are received within Holding Time. | True | |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | |
| Sample collection date/times are provided. | True | |
| Appropriate sample containers are used. | True | |
| Sample bottles are completely filled. | True | |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs | True | |
| VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter. | N/A | |
| If necessary, staff have been informed of any short hold time or quick TAT needs | True | |
| Multiphasic samples are not present. | N/A | |
| Samples do not require splitting or compositing. | N/A | |
| Is the Field Sampler's name present on COC? | True | |
| Sample Preservation Verified | True | |

# ATTACHMENT 15

## Review of 2010 Surface Water and Sediment Sample Results

# ATTACHMENT 15
# REVIEW OF SURFACE WATER AND SEDIMENT RESULTS, 2010

| | | NUTRIENTS AND OTHER IN WATER | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | STATIONS | | | | | | | | | | | | | | | | | | | |
| | Proposed Marine Std | 1A | 2A | 3A | 3B | 4B | 4C | 4D | 4E | 4F | 5A | 6B | 7A | 7B | 8A | 9A | 10 | 11A | 12A | 13 | 14 |
| Depth (ft) (f) | | 0.5 | 1.3 | 0.5 | 1.0 | 0.5 | 1.5 | 0.5 | 0.5 | 1.0 | 0.5 | 0.5 | 1.0 | 3.5 | 1.0 | 0.5 | 1.3 | 1.0 | 1.0 | 1.0 | 1.0 |
| pH (s.u.) (f) | 7.0-8.7 | 7.67 | 7.40 | 8.28 | 8.27 | 7.60 | 7.24 | 7.38 | 7.73 | 7.37 | 8.64 | 8.23 | 8.00 | 8.26 | 7.41 | 7.55 | 8.31 | 7.46 | 7.56 | 7.53 | 7.31 |
| Conductivity (uS) (f) | | 981 | 824 | 3300 | 3240 | 2570 | 2060 | 2190 | 1876 | 811 | 709 | 3410 | 3230 | 3320 | 1630 | 1420 | 3280 | 3150 | 2490 | 970 | 1410 |
| Temperature, deg C (f) | < 31 | 25.7 | 26.3 | 28.7 | 28.5 | 26.7 | 25.3 | 26.6 | 26.0 | 24.6 | 35.1 | 29.4 | 29.0 | 29.6 | 26.4 | 26.3 | 30.0 | 27.3 | 28.2 | 26.2 | 27.7 |
| Salinity, (ppt) (f) | 20-38 | 0.6 | 0.5 | 1.9 | 1.9 | 1.0 | 1.2 | 1.3 | 1.1 | 0.4 | 0.4 | 1.9 | 2.0 | 2.0 | 0.9 | 0.8 | 1.9 | 1.7 | 1.4 | 0.5 | 0.8 |
| Dissolved Oxygen, (mg/l) (f) | 90% sat. | 2.56 | 1.02 | 7.82 | 6.67 | 1.20 | 1.60 | 0.83 | 2.36 | 0.20 | 15.44 | 6.82 | 3.17 | 8.32 | 0.50 | 1.62 | 5.99 | 5.01 | 4.50 | 2.50 | 2.42 |
| Fecal Coliform (cols/100 ml) | 200 | 460 | 460 | 500 | 160 | 1300 | 2200 | 2600 | 230 | CG w/FC in 0.3ml | <100 | 560 | 53 | 430 | 100 | 600 | 2400 | 80 | 20 | 40 | 230 |
| Fecal Streptococcus (cols/100 ml) | 35 | 630 | 500 | 200 | 130 | 200 | 1800 | 6800 | 300 | 4500 | 33 | 170 | 110 | 140 | 36 | 240 | E1200 | 120 | 36 | 130 | 2000 |
| Enterococcus (cols/100 ml) | 35 | 240 | 480 | 240 | 110 | 400 | 2300 | 6700 | 280 | 1600 | <33 | 140 | 71 | 96 | 33 | 79 | 2300 | 73 | 15 | 150 | 1600 |
| Nitrite as N (mg/l) | 0.0098 | <0.1 | <0.1 | <0.1 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | ~0.16 | <0.10 |
| Nitrate as N (mg/l) | 0.0098 | <0.1 | ~0.33 | <0.1 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | 1.7 | ~0.41 | 5.8 | ~0.33 |
| Ammonia as N (mg/l) | 0.0098 | 0.091 | 0.19 | ~0.096 | 0.1 | 0.29 | 0.13 | 0.15 | 0.73 | 1.1 | 0.15 | 0.11 | 0.1 | 0.17 | 0.28 | 0.1 | 0.12 | 0.33 | 0.21 | 0.12 | 0.19 |
| Total Phosphorous (mg/l) | 0.015 | ~0.13 | ~0.21 | ~0.15 | ~0.12 | ~0.26 | ~0.21 | 0.55 | ~0.21 | 1.3 | ~0.23 | <0.10 | ~0.11 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 |
| Sulfate (mg/l) | | 50 | 45 | 140 | 140 | 110 | 62 | 69 | 88 | <2.0 | 48 | 140 | 160 | 140 | 82 | 69 | 150 | 150 | 120 | 71 | 90 |
| Sulfide (mg/l) | | <1.0 | <1.0 | <1.0 | <1.0 | 1.3 | 1.1 | <1.0 | <1.0 | 5.3 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Chemical Oxygen Demand (mg/L) | | 44 | ~15 | 51 | 48 | 270 | 56 | 55 | 41 | 460 | 34 | 63 | 51 | 48 | 21 | 20 | 49 | 33 | 33 | <10 | 30 |
| Alkalinity (mg/l) | | 210 | 340 | 440 | 440 | 650 | 530 | 540 | 430 | 160 | 210 | 470 | 420 | 440 | 280 | 290 | 440 | 270 | 280 | 280 | 310 |
| Total Suspended Solids (mg/L) | 5 | 32 | 11 | 18 | 8.4 | 39 | 8.8 | 8 | 44 | 110 | 280 | 22 | 11 | 9.6 | 10 | 16 | 8 | 110.0 | 4.4 | 31 | 150.0 |
| Chloride (mg/l) | | 140 | 89 | 1000 | 960 | 590 | 510 | 500 | 490 | 150 | 110 | 960 | 1100 | 1000 | 440 | 340 | 1200 | 950 | 670 | 160 | 290 |
| Tannins and Lignins (mg/L) | | 0.92 | 0.7 | 1.5 | 1.6 | 4.4 | 3.0 | 4 | 1.5 | 5.9 | 0.51 | 2.3 | 1.6 | 1.5 | 1.2 | 1.2 | 1.6 | 1.0 | 1.1 | 0.5 | 1.0 |
| Biochemical Oxygen Demand (mg/L) | | 7.38 | 4.38 | 2.58 | 4.64 | 6.55 | 10.3 | 11.5 | 3.6 | 88.8 | 8.84 | 8.72 | 4.2 | 3.93 | <2.00 | <2.00 | 2.95 | <2.00 | <2.00 | 2.16 | 2.73 |
| Chlorophyll A (ug/l) | 0.5 | 137 | 25.3 | 21.1 | 22.6 | 4.4 | 91.8 | 40.7 | 3.2 | 98.9 | 22 | 30.9 | 37.2 | 24.2 | 18.3 | 29.6 | 15 | 21.7 | 10.3 | 14.9 | 64.2 |
| Turbidity (NTU) | 1.5 | 11 | 4.9 | 2.9 | 2.9 | 12 | 11 | 8 | 17 | 280 | 46 | 15 | 4.6 | 2.7 | 6.5 | 5.7 | 4.1 | 45 | 3.5 | 17 | 79 |
| Salinity (ppt) | | <2.0 | <2.0 | 2.5 | 2.5 | 2 | <2.0 | 2 | <2.0 | <2.0 | <2.0 | 3.0 | 2.5 | 2.5 | <2.0 | <2.0 | 2.5 | 2.5 | 2.0 | <2.0 | <2.0 |
| Carbon Dioxide as CO2 (ug/l) | | 130 | 200 | ~35 | ~36 | 200 | 410 | 230 | 130 | 310 | ~13 | 63 | 54 | <36 | 140 | 130 | <42 | 97 | 100 | 110 | 170 |

| | | NUTRIENTS AND OTHER IN SEDIMENT | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | STATIONS | | | | | | | | | | | | | | | | | | | |
| | | 1A | 2A | 3A | 3B | 4B | 4C | 4D | 4E | 4F | 5A | 6B | 7A | 7B | 8A | 9A | 10 | 11A | 12A | 13 | 14 |
| Nitrite as N (mg/kg) | * | <1.0 | ~1.5 | <1.0 | | <1.0 | | | <1.0 | <1.0 | | <1.0 | <1.0 | | <1.0 | | <1.0 | <1.0 | | <1.0 | |
| Nitrate as N (mg/kg) | * | <1.0 | <1.0 | <1.0 | | <1.0 | | | ~1.4 | <1.0 | | <1.0 | <1.0 | | <1.0 | | <1.0 | <1.0 | | <1.0 | |
| Ammonia as N (mg/kg) | * | 65 | 2.1 | 6.9 | | 11 | | | 30 | 9.3 | | 14 | 8.8 | | 6.8 | | 35 | 18 | | 46 | |
| Total Phosphorous (mg/kg) | * | 690 | 2300 | 240 | | 140 | | | 630 | 1300 | | 670 | 270 | | 160 | | 220 | 360 | | 360 | |
| Orthophosphorous (mg/l) | | ~1.6 | 3.5 | ~0.87 | | ~1.5 | | | ~2.6 | 3.1 | | ~1.9 | ~0.91 | | <0.75 | | 3.9 | ~1.4 | | ~1.3 | |
| Sulfate (mg/kg) | | <100 | <100 | <98 | | <97 | | | <99 | 620 | | <98 | <96 | | <100 | | <100 | <97 | | <100 | |
| Sulfide (mg/kg) | | 47 | 25 | <25 | | <25 | | | 30 | 240 | | <25 | <25 | | <25 | | <25 | 29 | | <25 | |
| Total Organic Carbon (TOC) (mg/kg) | * | 42000 | 35000 | 210000 | | 150000 | | | 31000 | 22000 | | 39000 | 30000 | | 18000 | | 140000 | 38000 | | 57000 | |
| pH (SU) | * | 7.89 | 8.11 | 7.84 | | 7.53 | | | 7.73 | 7.5 | | 7.56 | 7.51 | | 7.56 | | 7.45 | 7.62 | | 7.41 | |
| Percent Moisture (%) | | 22 | 37 | 6.6 | | 8.6 | | | 49 | 68 | | 22 | 41 | | 32 | | 9.8 | 34 | | 26 | |

CG w/FC - Confluent growth with faecal coliforms also present
E - Estimated result
(f) - Field reading
* - Proposed surface water standard exists for the compound

# ATTACHMENT 15
# REVIEW OF SURFACE WATER AND SEDIMENT RESULTS, 2010

| | | HEAVY METALS IN WATER (mg/L) | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | | |
| | | STATIONS | | | | | | | | | | | | | | | | | | | |
| | **Proposed Marine Std** | **1A** | **2A** | **3A** | **3B** | **4B** | **4C** | **4D** | **4E** | **4F** | **5A** | **6B** | **7A** | **7B** | **8A** | **9A** | **10** | **11A** | **12A** | **13** | **14** |
| Copper | 0.0013 | ~0.0045 | ~0.0034 | <0.0029 | <0.0029 | 0.044 | <0.0029 | <0.0029 | <0.0029 | 0.018 | 0.012 | <0.0029 | <0.0029 | <0.0029 | <0.0029 | <0.0029 | <0.0029 | <0.0029 | <0.0029 | <0.0029 | <0.0029 |
| Iron | N/A | 1.5 | 1.2 | ~0.068 | ~0.055 | 5.1 | ~0.063 | ~0.068 | 0.38 | 1.4 | 8.5 | ~0.16 | ~0.11 | ~0.067 | ~0.052 | ~0.12 | ~0.075 | 0.24 | ~0.053 | 0.34 | 0.33 |
| Potassium | N/A | 12 | 8.2 | 32 | 32 | 49 | 30 | 33 | 25 | 8.6 | 10 | 33 | 31 | 32 | 21 | 17 | 32 | 41 | 30 | 11 | 20 |
| Magnesium | N/A | 37 | 32 | 91 | 90 | 86 | 63 | 68 | 66 | 9.6 | 30 | 98 | 96 | 97 | 47 | 41 | 97 | 80 | 62 | 42 | 53 |
| Sodium | N/A | 110 | 85 | 610 | 600 | 440 | 320 | 340 | 300 | 100 | 97 | 620 | 580 | 590 | 280 | 210 | 590 | 570 | 410 | 110 | 210 |
| Lead | 0.0044 | <0.002 | <0.002 | <0.002 | <0.002 | 0.095 | <0.002 | <0.002 | ~0.0036 | ~0.0069 | ~0.0099 | <0.0020 | <0.002 | <0.002 | <0.0020 | <0.0020 | <0.002 | <0.0020 | <0.0020 | <0.0020 | <0.0020 |
| Mercury | 0.0001 | <0.000072 | <0.000072 | <0.000072 | <0.000072 | <0.000072 | <0.000071 | <0.000072 | <0.000071 | <0.000071 | <0.000072 | <0.000072 | <0.000071 | <0.000071 | <0.000072 | <0.000072 | <0.000071 | <0.000072 | <0.000072 | <0.000072 | <0.000072 |
| Zinc | 0.015 | 0.033 | 0.024 | <0.005 | ~0.017 | 0.14 | ~0.0097 | <0.005 | ~0.016 | 0.056 | 0.049 | ~0.015 | ~0.0082 | ~0.0093 | ~.0076 | 0.022 | ~0.0078 | ~0.014 | 0.033 | ~0.018 | 0.03 |

| | | HEAVY METALS IN SEDIMENT (mg/kg) | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | | |
| | | STATIONS | | | | | | | | | | | | | | | | | | | |
| | | **1A** | **2A** | **3A** | **3B** | **4B** | **4C** | **4D** | **4E** | **4F** | **5A** | **6B** | **7A** | **7B** | **8A** | **9A** | **10** | **11A** | **12A** | **13** | **14** |
| Aluminum | | 9700 | 9100 | 360 | | 1300 | | | 3200 | 3200 | | 2000 | 1200 | | 410 | | 1200 | 1700 | | 4200 | |
| Arsenic | | 0.54 | 0.78 | ~0.25 | | 0.64 | | | ~1.1 | ~1.6 | | ~0.33 | <0.89 | | <0.22 | | ~0.44 | 0.72 | | 0.57 | |
| Boron | | ~2.9 | 7.5 | 13 | | 7.7 | | | ~12 | ~8.7 | | 10 | ~8.0 | | 11.0 | | 5.4 | 8.4 | | ~4.4 | |
| Barium | | 18 | 21 | 3.3 | | 3.7 | | | 15 | 26 | | 9.6 | 5.8 | | 2.0 | | 5.2 | 6.3 | | 19 | |
| Calcium | | 23000 | 92000 | 9100 | | 14000 | | | 150000 | 210000 | | 110,000 | 160000 | | 41,000 | | 14000 | 82,000 | | 60,000 | |
| Cadmium | * | ~0.18 | ~0.26 | <0.086 | | <0.087 | | | <0.33 | <0.34 | | <0.086 | <0.34 | | <0.084 | | <0.085 | <0.085 | | ~0.097 | |
| Cobalt | | 3.4 | 2 | ~0.19 | | ~0.52 | | | ~0.82 | ~1.3 | | ~0.37 | <0.74 | | <0.18 | | ~0.25 | ~0.44 | | ~0.83 | |
| Chromium | * | 4.1 | 4.7 | ~0.41 | | 2.2 | | | 4.8 | 9.2 | | 1.8 | ~1.7 | | 1.0 | | 1.1 | 2.8 | | 4.2 | |
| Copper | * | 17 | 12 | 2.1 | | 9.2 | | | 12 | 23 | | 5.5 | ~2.7 | | ~1.7 | | 3.6 | 9.8 | | 6 | |
| Iron | | 6200 | 4900 | 290 | | 1200 | | | 2600 | 2900 | | 1100 | 860 | | 280 | | 850 | 1400 | | 2500 | |
| Magnesium | | 1700 | 2100 | 780 | | 640 | | | 4200 | 3300 | | 1900 | 1700 | | 1600 | | 1300 | 2300 | | 2100 | |
| Manganese | | 200 | 170 | 14 | | 17 | | | 44 | 65 | | 30 | 27 | | 6.0 | | 21 | 28 | | 53 | |
| Sodium | | 300 | 890 | 820 | | 640 | | | 1300 | 970 | | 1400 | 1500 | | 620 | | 960 | 880 | | 430 | |
| Lead | * | 9.9 | 13 | 3.9 | | 27 | | | 53 | 33 | | 14 | 5.2 | | 3.1 | | 16 | 18 | | 5.4 | |
| Strontium | | 810 | 2700 | 380 | | 260 | | | 2200 | 2000 | | 2500 | 2000 | | 630 | | 660 | 1100 | | 3100 | |
| Titanium | | 68 | 130 | 7.1 | | 25 | | | 40 | 27 | | 20 | ~3.4 | | 4.6 | | 27 | 30 | | 43 | |
| Vanadium | * | 14 | 16 | 2.1 | | 5.7 | | | 5.4 | 6.4 | | 3.1 | ~2.2 | | 2.1 | | 2.9 | 3.2 | | 6.4 | |
| Zinc | * | 15 | 13 | 6 | | 28 | | | 74 | 94 | | 8.9 | ~6.2 | | 3.9 | | 8.2 | 29 | | 21 | |
| Mercury | * | ~0.019 | 0.023 | ~0.011 | | 0.029 | | | ~0.016 | ~0.015 | | ~0.014 | <0.015 | | ~0.093 | | <0.037 | 0.024 | | 0.023 | |

* - Proposed surface water standard exists for the compound

# ATTACHMENT 15
# REVIEW OF SURFACE WATER AND SEDIMENT RESULTS, 2010

| | HERBICIDES IN WATER* (ug/L) | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | |
| | STATIONS | | | | | | | | | | | | | | | | | | | |
| | 1A | 2A | 3A | 3B | 4B | 4C | 4D | 4E | 4F | 5A | 6B | 7A | 7B | 8A | 9A | 10 | 11A | 12A | 13 | 14 |
| | | | | | | | | | | | | | | | | | | | | |
| **2,4,5-T** | < 1 | < 1 | < 0.95 | < 1 | < 0.95 | < 0.97 | < 0.96 | < 1.0 | < 0.97 | < 1 | <0.95 | < 0.95 | < 1.0 | <0.95 | <0.97 | < 0.96 | <0.96 | <0.95 | <1.0 | <0.95 |
| **2,4-D** | < 1 | < 1 | < 0.95 | < 1 | < 0.95 | < 0.97 | < 0.96 | < 1.0 | < 0.97 | < 1 | <0.95 | < 0.95 | < 1.0 | <0.95 | <0.97 | < 0.96 | <0.96 | <0.95 | <1.0 | <0.95 |
| **2,4-DB** | < 1 | < 1 | < 0.95 | < 1 | < 0.95 | < 0.97 | < 0.96 | < 1.0 | < 0.97 | < 1 | <0.95 | < 0.95 | < 1.0 | <0.95 | <0.97 | < 0.96 | <0.96 | <0.95 | <1.0 | <0.95 |
| **Dalapon** | < 25 | < 26 | < 24 | < 26 | < 24 | < 24 | < 24 | < 26 | < 24 | < 26 | <24 | < 24 | < 25 | <24 | <24 | < 24 | <24 | <24 | <25 | <24 |
| **Dicamba** | < 0.25 | < 0.26 | < 0.24 | < 0.26 | < 0.24 | < 0.24 | < 0.24 | < 0.26 | < 0.24 | < 0.26 | <0.24 | < 0.24 | < 0.25 | <0.24 | <0.24 | < 0.24 | <0.24 | <0.24 | <0.25 | <0.24 |
| **Dichlorprop** | < 1 | < 1 | < 0.95 | < 1 | < 0.95 | < 0.97 | < 0.96 | < 1.0 | < 0.97 | < 1 | <0.95 | < 0.95 | < 1.0 | <0.95 | <0.97 | < 0.96 | <0.96 | <0.95 | <1.0 | <0.95 |
| **Dinoseb** | < 1 | < 1 | < 0.95 | < 1 | < 0.95 | < 0.97 | < 0.96 | < 1.0 | < 0.97 | < 1 | <0.95 | < 0.95 | < 1.0 | <0.95 | <0.97 | < 0.96 | <0.96 | <0.95 | <1.0 | <0.95 |
| **MCPA** | < 34 | < 35 | < 32 | < 35 | < 32 | < 33 | < 33 | < 35 | < 33 | < 35 | <32 | < 32 | < 34 | <32 | <33 | < 33 | <33 | <32 | <34 | <32 |
| **MCPP** | < 35 | < 36 | < 33 | < 36 | < 33 | < 34 | < 34 | < 36 | < 34 | < 36 | <33 | < 33 | < 35 | <33 | <34 | < 34 | <34 | <33 | <35 | <33 |
| **Pentachlorophenol** | < 0.085 | < 0.088 | < 0.081 | < 0.087 | < 0.081 | < 0.083 | < 0.082 | < 0.087 | < 0.083 | < 0.088 | <0.081 | < 0.081 | < 0.086 | <0.081 | <0.083 | < 0.082 | <0.082 | <0.081 | <0.086 | <0.081 |
| **Picloram** | < 1 | < 1 | < 0.95 | < 1 | < 0.95 | < 0.97 | < 0.96 | < 1.0 | < 0.97 | < 1 | <0.95 | < 0.95 | < 1.0 | <0.95 | <0.97 | < 0.96 | <0.96 | <0.95 | <1.0 | <0.95 |
| **Silvex (2,4,5-TP)** | < 1 | < 1 | < 0.95 | < 1 | < 0.95 | < 0.97 | < 0.96 | < 1.0 | < 0.97 | < 1 | <0.95 | < 0.95 | < 1.0 | <0.95 | <0.97 | < 0.96 | <0.96 | <0.95 | <1.0 | <0.95 |

| | HERBICIDES IN SEDIMENT (ug/kg) | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | |
| | STATIONS | | | | | | | | | | | | | | | | | | | |
| | 1A | 2A | 3A | 3B | 4B | 4C | 4D | 4E | 4F | 5A | 6B | 7A | 7B | 8A | 9A | 10 | 11A | 12A | 13 | 14 |
| **2,4,5-T** | < 10 | < 10 | < 9.9 | | < 10 | | | < 9.9 | < 10 | | <10 | < 10 | | <10 | | < 9.9 | <9.9 | | <10 | |
| **2,4-D** | < 1.6 | < 1.6 | < 1.6 | | < 1.6 | | | < 1.6 | < 1.6 | | <1.6 | < 1.6 | | <1.6 | | < 1.6 | <1.6 | | <1.6 | |
| **2,4-DB** | < 6.4 | < 6.5 | < 6.3 | | < 6.4 | | | < 6.3 | < 6.4 | | <6.5 | < 6.5 | | <6.4 | | < 6.4 | <6.4 | | <6.4 | |
| **Dalapon** | < 23 | < 23 | < 23 | | < 23 | | | < 23 | < 23 | | <23 | < 23 | | <23 | | < 23 | <23 | | <23 | |
| **Dicamba** | < 12 | < 12 | < 12 | | < 12 | | | < 12 | < 12 | | <12 | < 12 | | <12 | | < 12 | <12 | | <12 | |
| **Dichlorprop** | < 25 | < 25 | < 25 | | < 25 | | | < 25 | < 25 | | <25 | < 25 | | <25 | | < 25 | <25 | | <25 | |
| **Dinoseb** | < 8.3 | < 8.4 | < 8.2 | | < 8.3 | | | < 8.2 | < 8.3 | | <8.4 | < 8.4 | | <8.3 | | < 8.3 | <8.2 | | <8.4 | |
| **MCPA** | < 740 | < 750 | < 730 | | < 740 | | | < 730 | < 740 | | <750 | < 750 | | <740 | | < 740 | <730 | | <740 | |
| **MCPP** | < 400 | < 410 | < 390 | | < 400 | | | < 390 | < 400 | | <410 | < 410 | | <400 | | < 400 | <400 | | <400 | |
| **Pentachlorophenol** | < 5 | < 5.1 | < 4.9 | | < 5 | | | < 4.9 | < 5 | | <5.1 | < 5.1 | | <5.0 | | < 5 | <5.0 | | <5.0 | |
| **Picloram** | < 1.2 | < 1.2 | < 1.2 | | < 1.2 | | | < 1.2 | < 1.2 | | <1.2 | < 1.2 | | <1.2 | | < 1.2 | <1.2 | | <1.2 | |
| **Silvex (2,4,5-TP)** | < 10 | < 10 | < 9.9 | | < 10 | | | < 9.9 | < 10 | | <10 | < 10 | | <10 | | < 9.9 | <9.9 | | <10 | |

* - Proposed Marine Surface Water Standard is for non-detectable quantities based upon best available technology.

# ATTACHMENT 15
# REVIEW OF SURFACE WATER AND SEDIMENT RESULTS, 2010

| | ORGANOCHLORINE PESTICIDES IN WATER* (ug/L) | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | |
| | STATIONS | | | | | | | | | | | | | | | | | | | |
| | 1A | 2A | 3A | 3B | 4B | 4C | 4D | 4E | 4F | 5A | 6B | 7A | 7B | 8A | 9A | 10 | 11A | 12A | 13 | 14 |
| **4,4'-DDD** | < 0.0039 | < 0.004 | < 0.0039 | < 0.0039 | < 0.0039 | < 0.004 | < 0.0039 | < 0.004 | < 0.0039 | < 0.0043 | <0.0039 | < 0.0044 | < 0.0039 | <0.0039 | <0.0039 | < 0.0039 | <0.0039 | <0.0039 | <0.0041 | <0.0040 |
| **4,4'-DDE** | < 0.0053 | < 0.0054 | < 0.0053 | < 0.0053 | < 0.0052 | < 0.0053 | < 0.0052 | < 0.0053 | < 0.0052 | < 0.0058 | <0.0052 | < 0.006 | < 0.0053 | <0.0052 | <0.0052 | < 0.0052 | <0.0052 | <0.0052 | <0.0055 | <0.0054 |
| **4,4'-DDT** | < 0.003 | < 0.0031 | < 0.003 | < 0.003 | < 0.003 | < 0.0031 | < 0.003 | < 0.0031 | < 0.003 | < 0.0033 | <0.0030 | < 0.0034 | < 0.003 | <0.0030 | <0.0030 | < 0.003 | <0.0030 | <0.0030 | <0.0032 | <0.0031 |
| **Aldrin** | < 0.0018 | < 0.0018 | < 0.0018 | < 0.0018 | < 0.0017 | < 0.0018 | < 0.0017 | < 0.0018 | < 0.0017 | < 0.0019 | <0.0017 | < 0.002 | < 0.0018 | <0.0017 | <0.0017 | < 0.0017 | <0.0017 | <0.0017 | <0.0018 | <0.0018 |
| **alpha-BHC** | < 0.0027 | < 0.0027 | < 0.0027 | < 0.0027 | < 0.0027 | < 0.0027 | < 0.0027 | < 0.0027 | < 0.0027 | < 0.0029 | <0.0027 | < 0.003 | < 0.0027 | <0.0027 | <0.0027 | < 0.0027 | <0.0027 | <0.0027 | <0.0028 | <0.0027 |
| **beta-BHC** | < 0.0026 | < 0.0026 | < 0.0026 | < 0.0026 | < 0.0025 | < 0.0026 | < 0.0025 | < 0.0026 | < 0.0025 | < 0.0028 | <0.0025 | < 0.0029 | < 0.0026 | <0.0025 | <0.0025 | < 0.0025 | <0.0025 | <0.0025 | <0.0027 | <0.0026 |
| **Chlordane** | < 0.055 | < 0.056 | < 0.055 | < 0.055 | < 0.054 | < 0.055 | < 0.054 | < 0.055 | < 0.054 | < 0.06 | <0.054 | < 0.062 | < 0.055 | <0.054 | <0.054 | < 0.054 | <0.054 | <0.054 | <0.057 | <0.056 |
| **delta-BHC** | < 0.0027 | < 0.0027 | < 0.0027 | < 0.0027 | < 0.0026 | < 0.0027 | < 0.0026 | < 0.0027 | < 0.0026 | < 0.0029 | <0.0026 | < 0.003 | < 0.0027 | <0.0026 | <0.0026 | < 0.0026 | <0.0026 | <0.0026 | <0.0028 | <0.0027 |
| **Dieldrin** | ~ 0.0027 | 0.035 | < 0.0013 | < 0.0013 | < 0.0013 | < 0.0014 | < 0.0013 | < 0.0014 | < 0.0013 | ~ 0.0034 | <0.0013 | < 0.0015 | < 0.0013 | <0.0013 | <0.0013 | < 0.0013 | <0.0013 | <0.0013 | 0.016 | ~0.0028 |
| **Endosulfan I** | < 0.0033 | < 0.0034 | < 0.0033 | < 0.0033 | < 0.0033 | < 0.0033 | < 0.0033 | < 0.0033 | < 0.0032 | < 0.0036 | <0.0033 | < 0.0037 | < 0.0033 | <0.0033 | <0.0033 | < 0.0033 | <0.0033 | <0.0033 | <0.0034 | <0.0034 |
| **Endosulfan II** | < 0.0032 | < 0.0032 | < 0.0032 | < 0.0032 | < 0.0031 | < 0.0032 | < 0.0031 | < 0.0032 | < 0.0031 | < 0.0035 | <0.0031 | < 0.0036 | < 0.0032 | <0.0031 | <0.0031 | < 0.0031 | <0.0031 | <0.0031 | <0.0033 | <0.0032 |
| **Endosulfan sulfate** | < 0.0028 | < 0.0029 | < 0.0028 | < 0.0028 | < 0.0028 | < 0.0029 | < 0.0028 | < 0.0029 | < 0.0028 | < 0.0031 | <0.0028 | < 0.0032 | < 0.0028 | <0.0028 | <0.0028 | < 0.0028 | <0.0028 | <0.0028 | <0.0030 | <0.0029 |
| **Endrin** | < 0.003 | < 0.0031 | < 0.003 | < 0.003 | < 0.003 | < 0.003 | < 0.003 | < 0.003 | < 0.003 | < 0.0033 | <0.0030 | < 0.0034 | < 0.003 | <0.0030 | <0.0030 | < 0.003 | <0.0030 | <0.0030 | <0.0031 | <0.0031 |
| **Endrin Aldehyde** | < 0.0031 | < 0.0031 | < 0.0031 | < 0.0031 | < 0.003 | < 0.0031 | < 0.003 | < 0.0031 | < 0.003 | < 0.0034 | <0.0030 | < 0.0035 | < 0.0031 | <0.0030 | <0.0030 | < 0.003 | <0.0030 | <0.0030 | <0.0032 | <0.0031 |
| **Endrin Ketone** | < 0.0052 | < 0.0053 | < 0.0052 | < 0.0052 | < 0.0051 | < 0.0052 | < 0.0051 | < 0.0052 | < 0.0051 | < 0.0057 | <0.0051 | < 0.0059 | < 0.0052 | <0.0051 | <0.0051 | < 0.0051 | <0.0051 | <0.0051 | <0.0054 | <0.0053 |
| **gamma-BHC (Lindane)** | < 0.0025 | < 0.0026 | < 0.0025 | < 0.0025 | < 0.0025 | < 0.0025 | < 0.0025 | < 0.0025 | < 0.0025 | < 0.0027 | <0.0025 | < 0.0028 | < 0.0025 | <0.0025 | <0.0025 | < 0.0025 | <0.0025 | <0.0025 | <0.0026 | <0.0026 |
| **Heptachlor** | < 0.003 | < 0.003 | < 0.003 | < 0.003 | < 0.0029 | < 0.003 | < 0.0029 | < 0.003 | < 0.0029 | < 0.0032 | <0.0029 | < 0.0033 | < 0.003 | <0.0029 | <0.0029 | < 0.0029 | <0.0029 | <0.0029 | <0.0031 | <0.0030 |
| **Heptachlor epoxide** | < 0.003 | < 0.0031 | < 0.003 | < 0.003 | < 0.003 | < 0.0031 | < 0.003 | < 0.0031 | < 0.003 | < 0.0033 | <0.003 | < 0.0034 | < 0.003 | <0.003 | <0.003 | < 0.003 | <0.003 | <0.003 | <0.0031 | <0.0031 |
| **Methoxychlor** | < 0.0049 | < 0.005 | < 0.0049 | < 0.0049 | < 0.0048 | < 0.0049 | < 0.0048 | < 0.0049 | < 0.0048 | < 0.0053 | <0.0048 | < 0.0055 | < 0.0049 | <0.0048 | <0.0048 | < 0.0048 | <0.0048 | <0.0048 | <0.0051 | <0.005 |
| **Toxaphene** | < 0.69 | < 0.71 | < 0.69 | < 0.69 | < 0.69 | < 0.7 | < 0.69 | < 0.7 | < 0.68 | < 0.76 | <0.69 | < 0.78 | < 0.69 | <0.69 | <0.69 | < 0.69 | <0.69 | <0.69 | <0.72 | <0.71 |

| | ORGANOCHLORINE PESTICIDES IN SEDIMENT (ug/kg) | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | |
| | STATIONS | | | | | | | | | | | | | | | | | | | |
| | 1A | 2A | 3A | 3B | 4B | 4C | 4D | 4E | 4F | 5A | 6B | 7A | 7B | 8A | 9A | 10 | 11A | 12A | 13 | 14 |
| **4,4'-DDD** | < 0.5 | < 0.49 | < 0.5 | | < 0.5 | | | < 0.49 | < 0.49 | | <0.50 | < 0.5 | | <0.50 | | < 0.5 | <0.50 | | <0.50 | |
| **4,4'-DDE** | < 0.5 | < 0.49 | < 0.5 | | < 0.5 | | | ~ 0.51 | < 0.49 | | <0.50 | < 0.5 | | <0.50 | | < 0.5 | <0.50 | | <0.50 | |
| **4,4'-DDT** | < 0.5 | < 0.49 | < 0.5 | | < 0.5 | | | < 0.49 | < 0.49 | | <0.50 | < 0.5 | | <0.50 | | < 0.5 | <0.50 | | <0.50 | |
| **Aldrin** | < 0.5 | < 0.49 | < 0.5 | | < 0.5 | | | < 0.49 | < 0.49 | | <0.50 | < 0.5 | | <0.50 | | < 0.5 | <0.50 | | <0.50 | |
| **alpha-BHC** | < 0.14 | < 0.14 | < 0.14 | | < 0.14 | | | < 0.14 | < 0.14 | | <0.14 | < 0.14 | | <0.14 | | < 0.14 | <0.14 | | <0.14 | |
| **beta-BHC** | < 0.5 | < 0.49 | < 0.5 | | < 0.5 | | | < 0.49 | < 0.49 | | <0.50 | < 0.5 | | <0.50 | | < 0.5 | <0.50 | | <0.50 | |
| **Chlordane** | < 2.4 | < 2.4 | < 2.4 | | < 2.4 | | | < 2.4 | 85 | | ~14 | < 2.4 | | <2.4 | | < 2.4 | <2.4 | | <2.4 | |
| **delta-BHC** | < 0.5 | < 0.49 | < 0.5 | | < 0.5 | | | < 0.49 | < 0.49 | | <0.50 | < 0.5 | | <0.50 | | < 0.5 | <0.50 | | <0.50 | |
| **Dieldrin** | < 0.15 | < 0.15 | < 0.15 | | ~ 0.19 | | | ~ 0.42 | ~ 1.4 | | ~0.29 | < 0.15 | | <0.15 | | < 0.15 | <0.15 | | ~1.0 | |
| **Endosulfan I** | < 0.25 | < 0.25 | < 0.25 | | < 0.25 | | | < 0.25 | < 0.25 | | <0.25 | < 0.25 | | <0.25 | | < 0.25 | <0.25 | | <0.25 | |
| **Endosulfan II** | < 0.25 | < 0.25 | < 0.25 | | < 0.25 | | | < 0.25 | < 0.25 | | <0.25 | < 0.25 | | <0.25 | | < 0.25 | <0.25 | | <0.25 | |
| **Endosulfan sulfate** | < 0.25 | < 0.25 | < 0.25 | | < 0.25 | | | < 0.25 | < 0.25 | | <0.25 | < 0.25 | | <0.25 | | < 0.25 | <0.25 | | <0.25 | |
| **Endrin** | < 0.5 | < 0.49 | < 0.5 | | < 0.5 | | | < 0.49 | < 0.49 | | <0.50 | < 0.5 | | <0.50 | | < 0.5 | <0.50 | | <0.50 | |
| **Endrin Aldehyde** | < 0.5 | < 0.49 | < 0.5 | | < 0.5 | | | < 0.49 | < 0.49 | | <0.50 | < 0.5 | | <0.50 | | < 0.5 | <0.50 | | <0.50 | |
| **Endrin Ketone** | < 0.5 | < 0.49 | < 0.5 | | < 0.5 | | | < 0.49 | < 0.49 | | <0.50 | < 0.5 | | <0.50 | | < 0.5 | <0.50 | | <0.50 | |
| **gamma-BHC (Lindane)** | < 0.5 | < 0.49 | < 0.5 | | < 0.5 | | | < 0.49 | < 0.49 | | <0.50 | < 0.5 | | <0.50 | | < 0.5 | <0.50 | | <0.50 | |
| **Heptachlor** | < 0.5 | < 0.49 | < 0.5 | | < 0.5 | | | < 0.49 | < 0.49 | | <0.50 | < 0.5 | | <0.50 | | < 0.5 | <0.50 | | <0.50 | |
| **Heptachlor epoxide** | < 0.14 | < 0.14 | < 0.14 | | < 0.14 | | | < 0.14 | ~ 0.17 | | <0.14 | < 0.14 | | <0.14 | | < 0.14 | <0.14 | | <0.14 | |
| **Methoxychlor** | < 1 | < 0.99 | < 1 | | < 1 | | | < 0.99 | < 0.99 | | <1.0 | < 0.99 | | <1.0 | | < 1 | <1.0 | | <0.99 | |
| **Toxaphene** | < 29 | < 29 | < 29 | | < 29 | | | < 29 | < 29 | | <29 | < 29 | | <29 | | < 29 | <29 | | <29 | |

* - Proposed Marine Surface Water Standard is for non-detectable quantities based upon best available technology.

# ATTACHMENT 15
# REVIEW OF SURFACE WATER AND SEDIMENT RESULTS, 2010

| | ORGANOPHOSPHOROUS PESTICIDES IN WATER* (ug/L) | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | STATIONS | | | | | | | | | | | | | | | | | | | |
| | 1A | 2A | 3A | 3B | 4B | 4C | 4D | 4E | 4F | 5A | 6B | 7A | 7B | 8A | 9A | 10 | 11A | 12A | 13 | 14 |
| **Azinphos-methyl** | < 0.33 | < 0.32 | < 0.32 | < 0.32 | < 0.31 | < 0.32 | < 0.31 | < 0.32 | < 0.31 | < 0.33 | < 0.32 | < 0.31 | < 0.33 | < 0.32 | < 0.31 | < 0.32 | < 0.32 | < 0.31 | < 0.33 | < 0.31 |
| **Bolstar** | < 0.095 | < 0.091 | < 0.091 | < 0.091 | < 0.09 | < 0.093 | < 0.09 | < 0.093 | < 0.09 | < 0.095 | < 0.091 | < 0.09 | < 0.095 | < 0.091 | < 0.09 | < 0.091 | < 0.091 | < 0.09 | < 0.095 | < 0.09 |
| **Chlorpyrifos** | < 0.11 | < 0.11 | < 0.11 | < 0.11 | < 0.1 | < 0.11 | < 0.1 | < 0.11 | < 0.1 | < 0.11 | < 0.11 | < 0.1 | < 0.11 | < 0.11 | < 0.1 | < 0.11 | < 0.11 | < 0.1 | < 0.11 | < 0.1 |
| **Coumaphos** | < 0.081 | < 0.078 | < 0.078 | < 0.078 | < 0.076 | < 0.079 | < 0.076 | < 0.079 | < 0.076 | < 0.081 | < 0.078 | < 0.076 | < 0.081 | < 0.078 | < 0.076 | < 0.078 | < 0.078 | < 0.076 | < 0.081 | < 0.076 |
| **Demeton, Total** | < 0.15 | < 0.14 | < 0.14 | < 0.14 | < 0.14 | < 0.15 | < 0.14 | < 0.15 | < 0.14 | < 0.15 | < 0.14 | < 0.14 | < 0.15 | < 0.14 | < 0.14 | < 0.14 | < 0.14 | < 0.14 | < 0.15 | < 0.14 |
| **Diazinon** | < 0.11 | < 0.11 | < 0.11 | < 0.11 | < 0.1 | < 0.11 | < 0.1 | < 0.11 | < 0.1 | < 0.11 | < 0.11 | < 0.1 | < 0.11 | < 0.11 | < 0.1 | < 0.11 | < 0.11 | < 0.1 | < 0.11 | < 0.1 |
| **Dichlorvos** | < 0.26 | < 0.25 | < 0.25 | < 0.25 | < 0.25 | < 0.25 | < 0.25 | < 0.25 | < 0.25 | < 0.26 | < 0.25 | < 0.25 | < 0.26 | < 0.25 | < 0.25 | < 0.25 | < 0.25 | < 0.25 | < 0.26 | < 0.25 |
| **Dimethoate** | < 0.16 | < 0.15 | < 0.15 | < 0.15 | < 0.15 | < 0.31 | < 0.15 | < 0.31 | < 0.3 | < 0.16 | < 0.31 | < 0.3 | < 0.32 | < 0.31 | < 0.3 | < 0.31 | < 0.31 | < 0.3 | < 0.32 | < 0.3 |
| **Disulfoton** | < 0.32 | < 0.31 | < 0.31 | < 0.31 | < 0.3 | < 0.12 | < 0.3 | < 0.12 | < 0.11 | < 0.32 | < 0.12 | < 0.11 | < 0.12 | < 0.12 | < 0.11 | < 0.12 | < 0.12 | < 0.11 | < 0.12 | < 0.11 |
| **EPN** | < 0.12 | < 0.12 | < 0.12 | < 0.12 | < 0.11 | < 0.07 | < 0.11 | < 0.07 | < 0.067 | < 0.12 | < 0.068 | < 0.067 | < 0.071 | < 0.068 | < 0.067 | < 0.068 | < 0.068 | < 0.067 | < 0.071 | < 0.067 |
| **Ethoprop** | < 0.071 | < 0.068 | < 0.068 | < 0.068 | < 0.067 | < 0.4 | < 0.067 | < 0.4 | < 0.39 | < 0.071 | < 0.39 | < 0.39 | < 0.41 | < 0.39 | < 0.39 | < 0.39 | < 0.39 | < 0.39 | < 0.41 | < 0.39 |
| **Ethyl Parathion** | < 0.41 | < 0.39 | < 0.39 | < 0.39 | < 0.39 | < 0.078 | < 0.39 | < 0.078 | < 0.075 | < 0.41 | < 0.077 | < 0.075 | < 0.08 | < 0.077 | < 0.075 | < 0.077 | < 0.077 | < 0.075 | < 0.08 | < 0.075 |
| **Fensulfothion** | < 0.17 | < 0.16 | < 0.16 | < 0.16 | < 0.16 | < 0.17 | < 0.16 | < 0.17 | < 0.16 | < 0.17 | < 0.16 | < 0.16 | < 0.17 | < 0.16 | < 0.16 | < 0.16 | < 0.16 | < 0.16 | < 0.17 | < 0.16 |
| **Hexazinone** | < 0.092 | < 0.088 | < 0.088 | < 0.088 | < 0.087 | < 0.16 | < 0.087 | < 0.16 | < 0.15 | < 0.092 | < 0.15 | < 0.15 | < 0.16 | < 0.15 | < 0.15 | < 0.15 | < 0.15 | < 0.15 | < 0.16 | < 0.15 |
| **Malathion** | < 0.13 | < 0.12 | < 0.12 | < 0.12 | < 0.12 | < 0.09 | < 0.12 | < 0.09 | ~ 0.25 | < 0.13 | < 0.088 | < 0.087 | < 0.092 | < 0.088 | < 0.087 | < 0.088 | < 0.088 | < 0.087 | < 0.092 | < 0.087 |
| **Merphos** | < 0.15 | < 0.14 | < 0.14 | < 0.14 | < 0.14 | < 0.13 | < 0.14 | < 0.13 | < 0.12 | < 0.15 | < 0.12 | < 0.12 | < 0.13 | < 0.12 | < 0.12 | < 0.12 | < 0.12 | < 0.12 | < 0.13 | < 0.12 |
| **Methyl parathion** | < 2.6 | < 2.5 | < 2.5 | < 2.5 | < 2.5 | < 0.12 | < 2.5 | < 0.12 | < 0.11 | < 2.6 | < 0.12 | < 0.11 | < 0.12 | < 0.12 | < 0.11 | < 0.12 | < 0.12 | < 0.11 | < 0.12 | < 0.11 |
| **Mevinphos** | < 0.36 | < 0.35 | < 0.35 | < 0.35 | < 0.34 | < 0.15 | < 0.34 | < 0.15 | < 0.14 | < 0.36 | < 0.14 | < 0.14 | < 0.15 | < 0.14 | < 0.14 | < 0.14 | < 0.14 | < 0.14 | < 0.15 | < 0.14 |
| **Monochrotophos** | < 0.08 | < 0.077 | < 0.077 | < 0.077 | < 0.075 | < 2.5 | < 0.075 | < 2.5 | < 2.5 | < 0.08 | < 2.5 | < 2.5 | < 2.6 | < 2.5 | < 2.5 | < 2.5 | < 2.5 | < 2.5 | < 2.6 | < 2.5 |
| **Naled** | < 0.12 | < 0.12 | < 0.12 | < 0.12 | < 0.11 | < 0.35 | < 0.11 | < 0.35 | < 0.34 | < 0.12 | < 0.35 | < 0.34 | < 0.36 | < 0.35 | < 0.34 | < 0.35 | < 0.35 | < 0.34 | < 0.36 | < 0.34 |
| **Phorate** | < 0.16 | < 0.15 | < 0.15 | < 0.15 | < 0.15 | < 0.16 | < 0.15 | < 0.16 | < 0.15 | < 0.16 | < 0.15 | < 0.15 | < 0.16 | < 0.15 | < 0.15 | < 0.15 | < 0.15 | < 0.15 | < 0.16 | < 0.15 |
| **Ronnel** | < 0.13 | < 0.12 | < 0.12 | < 0.12 | < 0.12 | < 0.13 | < 0.12 | < 0.13 | < 0.12 | < 0.13 | < 0.12 | < 0.12 | < 0.13 | < 0.12 | < 0.12 | < 0.12 | < 0.12 | < 0.12 | < 0.13 | < 0.12 |
| **Stirophos** | < 0.055 | < 0.053 | < 0.053 | < 0.053 | < 0.052 | < 0.082 | < 0.052 | < 0.082 | < 0.079 | < 0.055 | < 0.081 | < 0.079 | < 0.084 | < 0.081 | < 0.079 | < 0.081 | < 0.081 | < 0.079 | < 0.084 | < 0.079 |
| **Sulfotepp** | < 0.084 | < 0.081 | < 0.081 | < 0.081 | < 0.079 | < 0.054 | < 0.079 | < 0.054 | < 0.052 | < 0.084 | < 0.053 | < 0.052 | < 0.055 | < 0.053 | < 0.052 | < 0.053 | < 0.053 | < 0.052 | < 0.055 | < 0.052 |
| **Tokuthion** | < 0.087 | < 0.084 | < 0.084 | < 0.084 | < 0.082 | < 0.085 | < 0.082 | < 0.085 | < 0.082 | < 0.087 | < 0.084 | < 0.082 | < 0.087 | < 0.084 | < 0.082 | < 0.084 | < 0.084 | < 0.082 | < 0.087 | < 0.082 |
| **Trichloronate** | < 0.11 | < 0.11 | < 0.11 | < 0.11 | < 0.1 | < 0.11 | < 0.1 | < 0.11 | < 0.1 | < 0.11 | < 0.11 | < 0.1 | < 0.11 | < 0.11 | < 0.1 | < 0.11 | < 0.11 | < 0.1 | < 0.11 | < 0.1 |

| | ORGANOPHOSPHOROUS PESTICIDES IN SEDIMENT (ug/kg) | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | STATIONS | | | | | | | | | | | | | | | | | | | |
| | 1A | 2A | 3A | 3B | 4B | 4C | 4D | 4E | 4F | 5A | 6B | 7A | 7B | 8A | 9A | 10 | 11A | 12A | 13 | 14 |
| **Azinphos-methyl** | < 4.4 | < 4.3 | < 4.4 | | < 4.3 | | | < 4.4 | < 4.3 | | < 4.4 | < 4.4 | | < 4.3 | | < 4.4 | < 4.3 | | < 4.4 | |
| **Bolstar** | < 8.5 | < 8.4 | < 8.5 | | < 8.4 | | | < 8.5 | < 8.4 | | < 8.5 | < 8.4 | | < 8.4 | | < 8.4 | < 8.4 | | < 8.5 | |
| **Chlorpyrifos** | < 8.4 | < 8.3 | < 8.4 | | < 8.3 | | | < 8.4 | < 8.3 | | < 8.4 | < 8.3 | | < 8.3 | | < 8.3 | < 8.3 | | < 8.4 | |
| **Coumaphos** | < 8.6 | < 8.5 | < 8.6 | | < 8.5 | | | < 8.6 | < 8.5 | | < 8.6 | < 8.5 | | < 8.5 | | < 8.5 | < 8.5 | | < 8.6 | |
| **Demeton, Total** | < 13 | < 13 | < 13 | | < 13 | | | < 13 | < 13 | | < 13 | < 13 | | < 13 | | < 13 | < 13 | | < 13 | |
| **Diazinon** | < 8.8 | < 8.7 | < 8.8 | | < 8.7 | | | < 8.8 | < 8.7 | | < 8.8 | < 8.7 | | < 8.7 | | < 8.7 | < 8.7 | | < 8.8 | |
| **Dichlorvos** | < 17 | < 17 | < 17 | | < 17 | | | < 17 | < 17 | | < 17 | < 17 | | < 17 | | < 17 | < 17 | | < 17 | |
| **Dimethoate** | < 9.9 | < 9.9 | < 10 | | < 9.8 | | | < 10 | < 9.9 | | < 10 | < 9.9 | | < 9.9 | | < 9.9 | < 9.9 | | < 10 | |
| **Disulfoton** | < 11 | < 11 | < 11 | | < 11 | | | < 11 | < 11 | | < 11 | < 11 | | < 11 | | < 11 | < 11 | | < 11 | |
| **EPN** | < 9 | < 9 | < 9.1 | | < 9 | | | < 9.1 | < 9 | | < 9.1 | < 9 | | < 9 | | < 9 | < 9 | | < 9.1 | |
| **Ethoprop** | < 15 | < 15 | < 15 | | < 15 | | | < 15 | < 15 | | < 15 | < 15 | | < 15 | | < 15 | < 15 | | < 15 | |
| **Ethyl Parathion** | < 8.8 | < 8.7 | < 8.8 | | < 8.7 | | | < 8.8 | < 8.7 | | < 8.8 | < 8.7 | | < 8.7 | | < 8.7 | < 8.7 | | < 8.8 | |
| **Fensulfothion** | < 9.9 | < 9.9 | < 10 | | < 9.8 | | | < 10 | < 9.9 | | < 10 | < 9.9 | | < 9.9 | | < 9.9 | < 9.9 | | < 10 | |
| **Hexazinone** | < 7.7 | < 7.6 | < 7.7 | | < 7.6 | | | < 7.7 | < 7.6 | | < 7.7 | < 7.6 | | < 7.6 | | < 7.6 | < 7.6 | | < 7.7 | |
| **Malathion** | < 8.9 | < 8.9 | < 9 | | < 8.9 | | | < 9 | < 8.9 | | < 9 | < 8.9 | | < 8.9 | | < 8.9 | < 8.9 | | < 9 | |
| **Merphos** | < 8.3 | < 8.2 | < 8.3 | | < 8.2 | | | < 8.3 | < 8.2 | | < 8.3 | < 8.2 | | < 8.2 | | < 8.2 | < 8.2 | | < 8.3 | |
| **Methyl parathion** | < 5.4 | < 5.3 | < 5.4 | | < 5.3 | | | < 5.4 | < 5.3 | | < 5.4 | < 5.4 | | < 5.3 | | < 5.4 | < 5.3 | | < 5.4 | |
| **Mevinphos** | < 11 | < 11 | < 11 | | < 11 | | | < 11 | < 11 | | < 11 | < 11 | | < 11 | | < 11 | < 11 | | < 11 | |
| **Monochrotophos** | < 85 | < 84 | < 85 | | < 84 | | | < 85 | < 84 | | < 85 | < 84 | | < 84 | | < 84 | < 84 | | < 85 | |
| **Naled** | < 5.2 | < 5.1 | < 5.2 | | < 5.1 | | | < 5.2 | < 5.1 | | < 5.2 | < 5.2 | | < 5.1 | | < 5.2 | < 5.1 | | < 5.2 | |
| **Phorate** | < 11 | < 11 | < 11 | | < 11 | | | < 11 | < 11 | | < 11 | < 11 | | < 11 | | < 11 | < 11 | | < 11 | |
| **Ronnel** | < 8 | < 7.9 | < 8 | | < 7.9 | | | < 8 | < 7.9 | | < 8 | < 7.9 | | < 7.9 | | < 7.9 | < 7.9 | | < 8 | |
| **Stirophos** | < 8.8 | < 8.8 | < 8.9 | | < 8.8 | | | < 8.9 | < 8.8 | | < 8.9 | < 8.8 | | < 8.8 | | < 8.8 | < 8.8 | | < 8.9 | |
| **Sulfotepp** | < 5.3 | < 5.2 | < 5.3 | | < 5.2 | | | < 5.3 | < 5.2 | | < 5.3 | < 5.3 | | < 5.2 | | < 5.3 | < 5.2 | | < 5.3 | |
| **Tokuthion** | < 7.7 | < 7.6 | < 7.7 | | < 7.6 | | | < 7.7 | < 7.6 | | < 7.7 | < 7.6 | | < 7.6 | | < 7.6 | < 7.6 | | < 7.7 | |
| **Trichloronate** | < 8.2 | < 8.1 | < 8.2 | | < 8.1 | | | < 8.2 | < 8.1 | | < 8.2 | < 8.1 | | < 8.1 | | < 8.1 | < 8.1 | | < 8.2 | |

* - Proposed Marine Surface Water Standard is for non-detectable quantities based upon best available technology.

# ATTACHMENT 16

## Review of Average Surface Water and Sediment Analytical Results in

A) Lake and South Pond
B) Bisecting Canal
C) South Ditch
D) Freshwater Ponds/ Springs
E) Eastern Offsite

# ATTACHMENT 16A

# COMPARISON OF SURFACE WATER AND SEDIMENT QUALITY, LAKE AND SOUTH POND 2001

| **Surf. Wat. Feb/Mar/ Apr-01** | **Average** | **6A** | **6B** | **7A** | **7B** | **10** |
|---|---|---|---|---|---|---|
| Ammonia (mg/l) | 0.21 | 0.22 | | 0.19 | | 0.21 |
| Temperature (deg C) | 29.26 | 28.3 | 29.8 | 28.9 | 29.6 | 29.7 |
| Dissolved Oxygen (mg/l) | 15.08 | 20 | 12.14 | 14.61 | 13.8 | 14.84 |
| BOD (mg/l) | 19.62 | n/a | 14.38 | 18.78 | 24.02 | 21.28 |
| Fecal (cols/ 100 ml) | 330 | 100 | | 560 | | 330 |
| Streptococci (cols/ 100 ml) | 1840 | 320 | | 700 | | 4500 |
| TSS (mg/l) | 2 | 2 | | 3 | 2 | 1 |
| pH (su) | 8.70 | 9.12 | 8.62 | 8.57 | 8.62 | 8.57 |
| Salinity (ppt) | 4.6 | 0 | 0 | 7.6 | 7.6 | 7.6 |
| Nitrate (mg/l) | 0.00 | 0.01 | | <.01 | | <.01 |
| Phosphates (mg/l) | 0.03 | 0.04 | | 0.04 | | 0.02 |
| | | | | | | |
| **Sediment 2001** | | | | | | |
| Sodium (mg/kg) | 5610 | 4640 | | | 6580 | |
| Aluminum (mg/kg) | 5765 | 3950 | | | 7580 | |
| Arsenic (mg/kg) | 2.7 | 2.6 | | | 2.7 | |
| Barium (mg/kg) | 80 | 16.5 | | | 144 | |
| Calcium (mg/kg) | 141100 | 234000 | | | 48200 | |
| Cadmium (mg/kg) | 0.2 | <0.2 | | | 0.4 | |
| Cobalt (mg/kg) | 5.55 | 3.2 | | | 7.9 | |
| Chromium (mg/kg) | 10.15 | 7.5 | | | 12.8 | |
| Copper (mg/kg) | 12.15 | 8.7 | | | 15.6 | |
| Iron (mg/kg) | 10770 | 7140 | | | 14400 | |
| Magnesium (mg/kg) | 3115 | 3910 | | | 2320 | |
| Manganese (mg/kg) | 302 | 93.8 | | | 510 | |
| Lead (mg/kg) | 6 | 6 | | | 6 | |
| Strontium (mg/kg) | 2069 | 3900 | | | 237 | |
| Titanium (mg/kg) | 16.0 | <0.3 | | | 32 | |
| Vanadium (mg/kg) | 20.6 | 13.9 | | | 27.3 | |
| Zinc (mg/kg) | 44.3 | 39.2 | | | 49.3 | |
| Mercury (mg/kg) | <0.05 | <0.05 | | | <0.05 | |
| Phosphorous (mg/kg) | 954 | 957 | | | 950 | |

# ATTACHMENT 16A
## COMPARISON OF SURFACE WATER AND SEDIMENT QUALITY, LAKE AND SOUTH POND 2002

| **Surface Water Apr-02** | **Average** | **6A** | **6B** | **7A** | **7B** | **10** |
|---|---|---|---|---|---|---|
| Ammonia | 0.15 | 0.016 | 0.011 | 0.24 | 0.184 | 0.318 |
| Temperature (deg C) | 32.22 | 33.4 | 32.8 | 31.3 | 31.5 | 32.1 |
| Dissolved Oxygen (mg/l) | 13.73 | 16.32 | 15.47 | 10.84 | 9.62 | 16.39 |
| BOD (mg/l) | 6.65 | 5.26 | 6.71 | 6.53 | 8.29 | 6.46 |
| Fecal (cols/ 100 ml) | 667 | 191 | 615 | 644 | 424 | 1463 |
| Streptococci (cols/ 100 ml) | 318 | 480 | 374 | 109 | 103 | 523 |
| TSS (mg/l) | 32 | 20 | 20 | 15 | 32.5 | 70 |
| pH (su) | 8.69 | 8.94 | 8.69 | 8.57 | 8.58 | 8.68 |
| Salinity (ppt) | 8.4 | 8.98 | 8.85 | 8.03 | 8.25 | 8.05 |
| Sodium (mg/l) | 2426 | 2540 | 2610 | 2410 | 2340 | 2230 |
| Nitrate (mg/l) | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphates (mg/l) | 0.06 | 0.01 | <0.005 | 0.071 | 0.098 | 0.131 |
| Copper (mg/l) | 0.0190 | 0.019 | 0.0209 | 0.0186 | 0.019 | 0.0173 |
| Iron (mg/l) | 0.087 | 0.058 | 0.309 | 0.012 | 0.007 | 0.05 |
| Potassium (mg/l) | 96 | 100 | 101 | 96 | 92 | 91 |
| Magnesium (mg/l) | 287 | 300 | 301 | 287 | 274 | 272 |
| Sodium (mg/l) | 2426 | 2540 | 2610 | 2410 | 2340 | 2230 |
| Lead (mg/l) | 0.0011 | 0.0006 | 0.0034 | <0.0005 | <0.0005 | 0.0013 |
| Mercury (mg/l) | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Zinc (mg/l) | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| | | | | | | |
| **Sediment Dec 02** | | | | | | |
| Sodium (mg/kg) | 9540 | 3960 | | 4060 | | 20600 |
| Aluminum (mg/kg) | 6703 | 3130 | | 4680 | | 12300 |
| Arsenic (mg/kg) | 1.8 | 0.3 | | 0.3 | | 4.8 |
| Barium (mg/kg) | 27 | 18.5 | | 15.1 | | 48.3 |
| Calcium (mg/kg) | 261000 | 297000 | | 348000 | | 138000 |
| Cadmium (mg/kg) | 0.73 | 0.08 | | 0.06 | | 0.36 |
| Cobalt (mg/kg) | 1.9 | 1.2 | | 1.4 | | 3.1 |
| Chromium (mg/kg) | 5.2 | 2 | | 2.7 | | 10.8 |
| Copper (mg/kg) | 18 | 5.2 | | 6.7 | | 41.5 |
| Iron (mg/kg) | 4597 | 2420 | | 2620 | | 8750 |
| Magnesium (mg/kg) | 8590 | 4160 | | 5010 | | 16600 |
| Manganese (mg/kg) | 109 | 68.7 | | 57 | | 202 |
| Lead (mg/kg) | 73 | 15.7 | | 14.1 | | 189 |
| Strontium (mg/kg) | 5030 | 5080 | | 4780 | | 5230 |
| Titanium (mg/kg) | 61 | 36 | | 35 | | 113 |
| Vanadium (mg/kg) | 24 | 8 | | 12 | | 53 |
| Zinc (mg/kg) | 48 | 14 | | 9.1 | | 121 |
| Mercury (mg/kg) | 0.04 | <0.05 | | <0.05 | | 0.11 |

# ATTACHMENT 16A
# COMPARISON OF SURFACE WATER AND SEDIMENT QUALITY, LAKE AND SOUTH POND 2010

**Feb 2010**

| **Surface Water** | **Average** | **3A** | **3B** | **6B** | **7A** | **7B** | **10** |
|---|---|---|---|---|---|---|---|
| Ammonia as N (mg/l) | 0.12 | ~0.096 | 0.1 | 0.11 | 0.1 | 0.17 | 0.12 |
| Temperature (deg C) | 29.20 | 28.7 | 28.5 | 29.4 | 29.0 | 29.6 | 30.0 |
| Dissolved Oxygen (mg/l) | 6.47 | 7.82 | 6.67 | 6.82 | 3.17 | 8.32 | 5.99 |
| BOD (mg/l) | 4.50 | 2.58 | 4.64 | 8.72 | 4.2 | 3.93 | 2.95 |
| Fecal (cols/ 100 ml) | 684 | 500 | 160 | 560 | 53 | 430 | 2400 |
| Streptococci (cols/ 100 ml) | 325 | 200 | 130 | 170 | 110 | 140 | E1200 |
| Enterococci (cols/ 100 ml) | 493 | 240 | 110 | 140 | 71 | 96 | 2300 |
| TSS (mg/l) | 13 | 18 | 8.4 | 22 | 11 | 9.6 | 8 |
| pH (su) | 8.23 | 8.28 | 8.27 | 8.23 | 8.00 | 8.26 | 8.31 |
| Salinity (ppt) | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 |
| Sodium (mg/l) | 598 | 610 | 600 | 620 | 580 | 590 | 590 |
| Nitrate (mg/l) | <0.1 | <0.1 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 |
| Phosphorous (mg/l) | 0.07 | ~0.15 | ~0.12 | <0.10 | ~0.11 | <0.10 | <0.10 |
| Copper (mg/l) | <0.0029 | <0.0029 | <0.0029 | <0.0029 | <0.0029 | <0.0029 | <0.0029 |
| Iron (mg/l) | 0.09 | ~0.068 | ~0.055 | ~0.16 | ~0.11 | ~0.067 | ~0.075 |
| Potassium (mg/l) | 32 | 32 | 32 | 33 | 31 | 32 | 32 |
| Magnesium (mg/l) | 94.83 | 91 | 90 | 98 | 96 | 97 | 97 |
| Sodium (mg/l) | 598 | 610 | 600 | 620 | 580 | 590 | 590 |
| Lead (mg/l) | <0.002 | <0.002 | <0.002 | <0.0020 | <0.002 | <0.002 | <0.002 |
| Mercury (mg/l) | <0.000072 | <0.000072 | <0.000072 | <0.000072 | <0.000071 | <0.000071 | <0.000071 |
| Zinc (mg/l) | 0.010 | <0.005 | ~0.017 | ~0.015 | ~0.0082 | ~0.0093 | ~0.0078 |
| Nitrite as N (mg/l) | <0.1 | <0.1 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 |
| Sulfate (mg/l) | 145 | 140 | 140 | 140 | 160 | 140 | 150 |
| Sulfide (mg/l) | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| COD (mg/L) | 52 | 51 | 48 | 63 | 51 | 48 | 49 |
| Alkalinity (mg/l) | 442 | 440 | 440 | 470 | 420 | 440 | 440 |
| Chloride (mg/l) | 1037 | 1000 | 960 | 960 | 1100 | 1000 | 1200 |
| Tannins and Lignins (mg/L) | 1.7 | 1.5 | 1.6 | 2.3 | 1.6 | 1.5 | 1.6 |
| Chlorophyll A (ug/l) | 25.2 | 21.1 | 22.6 | 30.9 | 37.2 | 24.2 | 15 |
| Turbidity (NTU) | 5.4 | 2.9 | 2.9 | 15 | 4.6 | 2.7 | 4.1 |
| CO2 (ug/l) | 47 | ~35 | ~36 | 63 | 54 | <36 | <42 |
| | | | | | | | |
| **Sediment** | | | | | | | |
| pH (su) | 7.59 | 7.84 | | 7.56 | 7.51 | | 7.45 |
| Nitrate (mg/kg) | <1.0 | <1.0 | | <1.0 | <1.0 | | <1.0 |
| Phosphorous (mg/kg) | 350 | 240 | | 670 | 270 | | 220 |
| Sodium (mg/kg) | 1170 | 820 | | 1400 | 1500 | | 960 |
| Aluminum (mg/kg) | 1190 | 360 | | 2000 | 1200 | | 1200 |
| Arsenic (mg/kg) | 0.26 | ~0.25 | | ~0.33 | <0.89 | | ~0.44 |
| Barium (mg/kg) | 6.0 | 3.3 | | 9.6 | 5.8 | | 5.2 |
| Calcium (mg/kg) | 73275 | 9100 | | 110,000 | 160000 | | 14000 |
| Cadmium (mg/kg) | <0.086 | <0.086 | | <0.086 | <0.34 | | <0.085 |
| Cobalt (mg/kg) | 0.20 | ~0.19 | | ~0.37 | <0.74 | | ~0.25 |
| Chromium (mg/kg) | 1.3 | ~0.41 | | 1.8 | ~1.7 | | 1.1 |
| Copper (mg/kg) | 3.5 | 2.1 | | 5.5 | ~2.7 | | 3.6 |
| Iron (mg/kg) | 775 | 290 | | 1100 | 860 | | 850 |
| Magnesium (mg/kg) | 1420 | 780 | | 1900 | 1700 | | 1300 |
| Manganese (mg/kg) | 23 | 14 | | 30 | 27 | | 21 |
| Lead (mg/kg) | 10 | 3.9 | | 14 | 5.2 | | 16 |
| Strontium (mg/kg) | 1385 | 380 | | 2500 | 2000 | | 660 |
| Titanium (mg/kg) | 14.0 | 7.1 | | 20 | ~3.4 | | 27 |
| Vanadium (mg/kg) | 2.6 | 2.1 | | 3.1 | ~2.2 | | 2.9 |
| Zinc (mg/kg) | 7.3 | 6 | | 8.9 | ~6.2 | | 8.2 |
| Mercury (mg/kg) | 0.006 | ~0.011 | | ~0.014 | <0.015 | | <0.037 |
| Ammonia as N (mg/kg) | 16 | 6.9 | | 14 | 8.8 | | 35 |
| Total Phosphorous (mg/kg) | 350 | 240 | | 670 | 270 | | 220 |
| Orthophosphorous (mg/l) | 1.9 | ~0.87 | | ~1.9 | ~0.91 | | 3.9 |
| Sulfate (mg/kg) | <98 | <98 | | <98 | <96 | | <100 |
| Sulfide (mg/kg) | <25 | <25 | | <25 | <25 | | <25 |
| TOC (mg/kg) | 104750 | 210000 | | 39000 | 30000 | | 140000 |

# ATTACHMENT 16B
# COMPARISON OF SURFACE WATER AND SEDIMENT QUALITY, BISECTING CANAL 2001

| **Surf. Wat. Feb/Mar/ Apr-01** | **Average** | **8** | **11** |
|---|---|---|---|
| Ammonia (mg/l) | >0.73 | n/a | >0.73 |
| Temperature (deg C) | 29.10 | 31,4 | 29.1 |
| Dissolved Oxygen (mg/l) | 9.43 | 9.74 | 9.11 |
| BOD (mg/l) | 12.91 | 14.82 | 11 |
| Fecal (cols/ 100 ml) | 395 | 590 | 200 |
| Streptococci (cols/ 100 ml) | 420 | n/a | 420 |
| TSS (mg/l) | 4 | 3 | 4 |
| pH (su) | 8.13 | 8.09 | 8.16 |
| Salinity (ppt) | 0.1 | 0.1 | 0.1 |
| Nitrate (mg/l) | 0.26 | <.01 | 0.51 |
| Phosphates (mg/l) | 0.05 | 0.01 | 0.09 |
| | | | |
| **Sediment 2001** | | | |
| Sodium (mg/kg) | | | |
| Aluminum (mg/kg) | | | |
| Arsenic (mg/kg) | | | |
| Barium (mg/kg) | | | |
| Calcium (mg/kg) | | | |
| Cadmium (mg/kg) | | | |
| Cobalt (mg/kg) | | | |
| Chromium (mg/kg) | | | |
| Copper (mg/kg) | | | |
| Iron (mg/kg) | | | |
| Magnesium (mg/kg) | | | |
| Manganese (mg/kg) | | | |
| Lead (mg/kg) | | | |
| Strontium (mg/kg) | | | |
| Titanium (mg/kg) | | | |
| Vanadium (mg/kg) | | | |
| Zinc (mg/kg) | | | |
| Mercury (mg/kg) | | | |
| Phosphorous (mg/kg) | | | |

# ATTACHMENT 16B

## COMPARISON OF SURFACE WATER AND SEDIMENT QUALITY, BISECTING CANAL 2002

| **Surface Water Apr-02** | **Average** | **8** | **11** |
|---|---|---|---|
| Ammonia | 0.42 | 0.024 | 0.813 |
| Temperature (deg C) | 31.30 | 31.4 | 31.2 |
| Dissolved Oxygen (mg/l) | 6.83 | 5.46 | 8.2 |
| BOD (mg/l) | 8.48 | 8.38 | 8.58 |
| Fecal (cols/ 100 ml) | 805 | 618 | 991 |
| Streptococci (cols/ 100 ml) | 297 | 174 | 419 |
| TSS (mg/l) | 36 | 27.5 | 45 |
| pH (su) | 8.21 | 8.27 | 8.14 |
| Salinity (ppt) | 4.0 | 3.4 | 4.55 |
| Sodium (mg/l) | 1237 | 973 | 1500 |
| Nitrate (mg/l) | <0.02 | <0.02 | <0.02 |
| Phosphates (mg/l) | <0.005 | <0.005 | <0.005 |
| Copper (mg/l) | 0.0109 | 0.0081 | 0.0136 |
| Iron (mg/l) | 0.084 | 0.031 | 0.137 |
| Potassium (mg/l) | 53 | 39 | 67 |
| Magnesium (mg/l) | 163 | 136 | 189 |
| Sodium (mg/l) | 1237 | 973 | 1500 |
| Lead (mg/l) | 0.0012 | 0.0009 | 0.00029 |
| Mercury (mg/l) | <0.00005 | <0.00005 | <0.00005 |
| Zinc (mg/l) | <0.005 | <0.005 | <0.005 |
| | | | |
| **Sediment Dec 02** | | | |
| Sodium (mg/kg) | 4160 | 4200 | 4120 |
| Aluminum (mg/kg) | 2638 | 426 | 4850 |
| Arsenic (mg/kg) | 1.1 | 0.4 | 1.8 |
| Barium (mg/kg) | 17 | 9.6 | 24 |
| Calcium (mg/kg) | 372000 | 389000 | 355000 |
| Cadmium (mg/kg) | 2.50 | <0.05 | 5 |
| Cobalt (mg/kg) | 1.1 | 0.6 | 1.6 |
| Chromium (mg/kg) | 7.2 | 5 | 9.4 |
| Copper (mg/kg) | 14 | 0.8 | 28 |
| Iron (mg/kg) | 2036 | 211 | 3860 |
| Magnesium (mg/kg) | 14450 | 18000 | 10900 |
| Manganese (mg/kg) | 138 | 192 | 83 |
| Lead (mg/kg) | 60 | 1.5 | 119 |
| Strontium (mg/kg) | 4175 | 5110 | 3240 |
| Titanium (mg/kg) | 44 | 9 | 78 |
| Vanadium (mg/kg) | 9 | 4 | 14 |
| Zinc (mg/kg) | 52 | 1.3 | 102 |
| Mercury (mg/kg) | <0.05 | <0.05 | <0.05 |

## ATTACHMENT 16B
## COMPARISON OF SURFACE WATER AND SEDIMENT QUALITY, BISECTING CANAL 2010

**Feb 2010**

| **Surface Water** | **Average** | **8A** | **11A** | **12** |
|---|---|---|---|---|
| Ammonia as N (mg/l) | 0.27 | 0.28 | 0.33 | 0.21 |
| Temperature (deg C) | 27.30 | 26.4 | 27.3 | 28.2 |
| Dissolved Oxygen (mg/l) | 3.34 | 0.50 | 5.01 | 4.50 |
| BOD (mg/l) | <2.00 | <2.00 | <2.00 | <2.00 |
| Fecal (cols/ 100 ml) | 67 | 100 | 80 | 20 |
| Streptococci (cols/ 100 ml) | 64 | 36 | 120 | 36 |
| Enterococci (cols/ 100 ml) | 40 | 33 | 73 | 15 |
| TSS (mg/l) | 41 | 10 | 110.0 | 4.4 |
| pH (su) | 7.48 | 7.41 | 7.46 | 7.56 |
| Salinity (ppt) | 1.3 | 0.9 | 1.7 | 1.4 |
| Sodium (mg/l) | 420 | 280 | 570 | 410 |
| Nitrate (mg/l) | 0.70 | <0.10 | 1.7 | ~0.41 |
| Phosphorous (mg/l) | <0.10 | <0.10 | <0.10 | <0.10 |
| Copper (mg/l) | <0.0029 | <0.0029 | <0.0029 | <0.0029 |
| Iron (mg/l) | 0.12 | ~0.052 | 0.24 | ~0.053 |
| Potassium (mg/l) | 31 | 21 | 41 | 30 |
| Magnesium (mg/l) | 63 | 47 | 80 | 62 |
| Sodium (mg/l) | 420 | 280 | 570 | 410 |
| Lead (mg/l) | <0.0020 | <0.0020 | <0.0020 | <0.0020 |
| Mercury (mg/l) | <0.000072 | <0.000072 | <0.000072 | <0.000072 |
| Zinc (mg/l) | 0.018 | ~.0076 | ~0.014 | 0.033 |
| Nitrite as N (mg/l) | <0.10 | <0.10 | <0.10 | <0.10 |
| Sulfate (mg/l) | 117 | 82 | 150 | 120 |
| Sulfide (mg/l) | <1.0 | <1.0 | <1.0 | <1.0 |
| COD (mg/L) | 29 | 21 | 33 | 33 |
| Alkalinity (mg/l) | 277 | 280 | 270 | 280 |
| Chloride (mg/l) | 687 | 440 | 950 | 670 |
| Tannins and Lignins (mg/L) | 1.1 | 1.2 | 1.0 | 1.1 |
| Chlorophyll A (ug/l) | 16.8 | 18.3 | 21.7 | 10.3 |
| Turbidity (NTU) | 18.3 | 6.5 | 45 | 3.5 |
| CO2 (ug/l) | 112 | 140 | 97 | 100 |
| | | | | |
| **Sediment** | | | | |
| pH (su) | 7.59 | 7.56 | 7.62 | |
| Nitrate (mg/kg) | <1.0 | <1.0 | <1.0 | |
| Phosphorous (mg/kg) | 260 | 160 | 360 | |
| Sodium (mg/kg) | 750 | 620 | 880 | |
| Aluminum (mg/kg) | 1055 | 410 | 1700 | |
| Arsenic (mg/kg) | 0.36 | <0.22 | 0.72 | |
| Barium (mg/kg) | 4.2 | 2.0 | 6.3 | |
| Calcium (mg/kg) | 61500 | 41,000 | 82,000 | |
| Cadmium (mg/kg) | <0.084 | <0.084 | <0.085 | |
| Cobalt (mg/kg) | 0.22 | <0.18 | ~0.44 | |
| Chromium (mg/kg) | 1.9 | 1.0 | 2.8 | |
| Copper (mg/kg) | 5.8 | ~1.7 | 9.8 | |
| Iron (mg/kg) | 840 | 280 | 1400 | |
| Magnesium (mg/kg) | 1950 | 1600 | 2300 | |
| Manganese (mg/kg) | 17 | 6.0 | 28 | |
| Lead (mg/kg) | 11 | 3.1 | 18 | |
| Strontium (mg/kg) | 865 | 630 | 1100 | |
| Titanium (mg/kg) | 17 | 4.6 | 30 | |
| Vanadium (mg/kg) | 6 | 2.1 | 3.2 | |
| Zinc (mg/kg) | 19 | 3.9 | 29 | |
| Mercury (mg/kg) | 0.059 | ~0.093 | 0.024 | |
| Ammonia as N (mg/kg) | 12 | 6.8 | 18 | |
| Total Phosphorous (mg/kg) | 260 | 160 | 360 | |
| Orthophosphorous (mg/l) | 0.7 | <0.75 | ~1.4 | |
| Sulfate (mg/kg) | <97 | <100 | <97 | |
| Sulfide (mg/kg) | 15 | <25 | 29 | |
| TOC (mg/kg) | 28000 | 18000 | 38000 | |

# ATTACHMENT 16C
# COMPARISON OF SURFACE WATER AND SEDIMENT QUALITY, SOUTH DITCH 2001

| **Surf. Wat. Feb/Mar/ Apr-01** | **Average** | **4A** | **4B** | **4C** | **4D** |
|---|---|---|---|---|---|
| Ammonia (mg/l) | 0.02 | 0.02 | | | |
| Temperature (deg C) | 29.33 | 30.8 | 31,6 | 26.6 | 30.6 |
| Dissolved Oxygen (mg/l) | 8.27 | 14.11 | 6.12 | 2.68 | 10.18 |
| BOD (mg/l) | 11.63 | 21.47 | 5.65 | 0.55 | 18.85 |
| Fecal (cols/ 100 ml) | 200 | 200 | | | |
| Streptococci (cols/ 100 ml) | 120 | 120 | | | |
| TSS (mg/l) | 11 | 11 | | | |
| pH (su) | 7.93 | 7.94 | 7.83 | 7.68 | 8.26 |
| Salinity (ppt) | 0.1 | 0.1 | 0 | 0 | 0.1 |
| Nitrate (mg/l) | <.01 | <.01 | | | |
| Phosphates (mg/l) | 0.05 | 0.05 | | | |
| | | | | | |

# ATTACHMENT 16C
# COMPARISON OF SURFACE WATER AND SEDIMENT QUALITY, SOUTH DITCH 2002

| **Surface Water Apr-02** | **Average** | **4A** | **4B** | **4C** | **4D** |
|---|---|---|---|---|---|
| Ammonia | 0.18 | 0.07 | 0.01 | 0.168 | 0.482 |
| Temperature (deg C) | 29.28 | 30.1 | 27.9 | 26.7 | 32.4 |
| Dissolved Oxygen (mg/l) | 3.81 | 5.62 | 0.38 | 0.78 | 8.47 |
| BOD (mg/l) | 8.35 | 6.96 | 10.76 | 10.83 | 4.84 |
| Fecal (cols/ 100 ml) | 965 | 557 | 1434 | 909 | 961 |
| Streptococci (cols/ 100 ml) | 690 | 191 | 375 | 1841 | 354 |
| TSS (mg/l) | 23 | 15 | 10 | 25 | 40 |
| pH (su) | 8.01 | 8.38 | 7.65 | 7.74 | 8.26 |
| Salinity (ppt) | 2.4 | 0.65 | 2.5 | 2.65 | 3.95 |
| Sodium (mg/l) | 947 | 625 | 1090 | 933 | 1140 |
| Nitrate (mg/l) | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Phosphates (mg/l) | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Copper (mg/l) | 0.0089 | 0.0064 | 0.0101 | 0.0083 | 0.0109 |
| Iron (mg/l) | 0.105 | 0.035 | 0.043 | 0.066 | 0.277 |
| Potassium (mg/l) | 41 | 27 | 45 | 41 | 49 |
| Magnesium (mg/l) | 126 | 89.3 | 145 | 122 | 147 |
| Sodium (mg/l) | 947 | 625 | 1090 | 933 | 1140 |
| Lead (mg/l) | 0.0025 | 0.001 | 0.0018 | 0.0012 | 0.0059 |
| Mercury (mg/l) | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Zinc (mg/l) | 0.001 | <0.005 | <0.005 | <0.005 | 0.005 |
| | | | | | |
| **Sediment Dec 02** | | | | | |
| Sodium (mg/kg) | 1630 | 1630 | | | |
| Aluminum (mg/kg) | 4420 | 4420 | | | |
| Arsenic (mg/kg) | 0.6 | 0.6 | | | |
| Barium (mg/kg) | 35 | 35 | | | |
| Calcium (mg/kg) | 339000 | 339000 | | | |
| Cadmium (mg/kg) | 0.12 | 0.12 | | | |
| Cobalt (mg/kg) | 1.4 | 1.4 | | | |
| Chromium (mg/kg) | 3.9 | 3.9 | | | |
| Copper (mg/kg) | 13.3 | 13.3 | | | |
| Iron (mg/kg) | 3000 | 3000 | | | |
| Magnesium (mg/kg) | 4800 | 4800 | | | |
| Manganese (mg/kg) | 98 | 98 | | | |
| Lead (mg/kg) | 72.8 | 72.8 | | | |
| Strontium (mg/kg) | 5090 | 5090 | | | |
| Titanium (mg/kg) | 68 | 68 | | | |
| Vanadium (mg/kg) | 10 | 10 | | | |
| Zinc (mg/kg) | 26.5 | 26.5 | | | |
| Mercury (mg/kg) | <0.05 | <0.05 | | | |

# ATTACHMENT 16C
# COMPARISON OF SURFACE WATER AND SEDIMENT QUALITY, SOUTH DITCH 2010

**Feb 2010**

| **Surface Water** | **Average** | **4B** | **4C** | **4D** | **4E** |
|---|---|---|---|---|---|
| Ammonia as N (mg/l) | 0.33 | 0.29 | 0.13 | 0.15 | 0.73 |
| Temperature (deg C) | 26.15 | 26.7 | 25.3 | 26.6 | 26.0 |
| Dissolved Oxygen (mg/l) | 1.50 | 1.20 | 1.60 | 0.83 | 2.36 |
| BOD (mg/l) | 7.99 | 6.55 | 10.3 | 11.5 | 3.6 |
| Fecal (cols/ 100 ml) | 1583 | 1300 | 2200 | 2600 | 230 |
| Streptococci (cols/ 100 ml) | 2275 | 200 | 1800 | 6800 | 300 |
| Enterococci (cols/ 100 ml) | 2420 | 400 | 2300 | 6700 | 280 |
| TSS (mg/l) | 25 | 39 | 8.8 | 8 | 44 |
| pH (su) | 7.49 | 7.60 | 7.24 | 7.38 | 7.73 |
| Salinity (ppt) | 1.2 | 1.0 | 1.2 | 1.3 | 1.1 |
| Sodium (mg/l) | 350 | 440 | 320 | 340 | 300 |
| Nitrate (mg/l) | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 |
| Phosphorous (mg/l) | 0.31 | ~0.26 | ~0.21 | 0.55 | ~0.21 |
| Copper (mg/l) | 0.011 | 0.044 | <0.0029 | <0.0029 | <0.0029 |
| Iron (mg/l) | 1.40 | 5.1 | ~0.063 | ~0.068 | 0.38 |
| Potassium (mg/l) | 34 | 49 | 30 | 33 | 25 |
| Magnesium (mg/l) | 70.75 | 86 | 63 | 68 | 66 |
| Sodium (mg/l) | 350 | 440 | 320 | 340 | 300 |
| Lead (mg/l) | 0.025 | 0.095 | <0.002 | <0.002 | ~0.0036 |
| Mercury (mg/l) | <0.000072 | <0.000072 | <0.000071 | <0.000072 | <0.000071 |
| Zinc (mg/l) | 0.041 | 0.14 | ~0.0097 | <0.005 | ~0.016 |
| Nitrite as N (mg/l) | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 |
| Sulfate (mg/l) | 82 | 110 | 62 | 69 | 88 |
| Sulfide (mg/l) | 0.6 | 1.3 | 1.1 | <1.0 | <1.0 |
| COD (mg/L) | 106 | 270 | 56 | 55 | 41 |
| Alkalinity (mg/l) | 538 | 650 | 530 | 540 | 430 |
| Chloride (mg/l) | 523 | 590 | 510 | 500 | 490 |
| Tannins and Lignins (mg/L) | 3.2 | 4.4 | 3.0 | 4 | 1.5 |
| Chlorophyll A (ug/l) | 35 | 4.4 | 91.8 | 40.7 | 3.2 |
| Turbidity (NTU) | 12 | 12 | 11 | 8 | 17 |
| CO2 (ug/l) | 243 | 200 | 410 | 230 | 130 |
| | | | | | |
| **Sediment** | | | | | |
| pH (su) | 7.63 | 7.53 | | | 7.73 |
| Nitrate (mg/kg) | 0.70 | <1.0 | | | ~1.4 |
| Phosphorous (mg/kg) | 385 | 140 | | | 630 |
| Sodium (mg/kg) | 970 | 640 | | | 1300 |
| Aluminum (mg/kg) | 2250 | 1300 | | | 3200 |
| Arsenic (mg/kg) | 0.87 | 0.64 | | | ~1.1 |
| Barium (mg/kg) | 9.4 | 3.7 | | | 15 |
| Calcium (mg/kg) | 82000 | 14000 | | | 150000 |
| Cadmium (mg/kg) | <.21 | <0.087 | | | <0.33 |
| Cobalt (mg/kg) | ~0.67 | ~0.52 | | | ~0.82 |
| Chromium (mg/kg) | 3.50 | 2.2 | | | 4.8 |
| Copper (mg/kg) | 10.60 | 9.2 | | | 12 |
| Iron (mg/kg) | 1900 | 1200 | | | 2600 |
| Magnesium (mg/kg) | 2420 | 640 | | | 4200 |
| Manganese (mg/kg) | 31 | 17 | | | 44 |
| Lead (mg/kg) | 40 | 27 | | | 53 |
| Strontium (mg/kg) | 1230 | 260 | | | 2200 |
| Titanium (mg/kg) | 33 | 25 | | | 40 |
| Vanadium (mg/kg) | 6 | 5.7 | | | 5.4 |
| Zinc (mg/kg) | 51 | 28 | | | 74 |
| Mercury (mg/kg) | 0.023 | 0.029 | | | ~0.016 |
| Ammonia as N (mg/kg) | 21 | 11 | | | 30 |
| Total Phosphorous (mg/kg) | 385 | 140 | | | 630 |
| Orthophosphorous (mg/l) | 2.1 | ~1.5 | | | ~2.6 |
| Sulfate (mg/kg) | <97 | <97 | | | <99 |
| Sulfide (mg/kg) | 15 | <25 | | | 30 |
| TOC (mg/kg) | 90500 | 150000 | | | 31000 |

# ATTACHMENT 16D
# COMPARISON OF SURFACE WATER AND SEDIMENT QUALITY, SPRINGS 2001

| **Surf. Wat. Feb/Mar/ Apr-01** | **Average** | **1A** | **2A** |
|---|---|---|---|
| Ammonia (mg/l) | 0.08 | 0.1 | 0.05 |
| Temperature (deg C) | 26.4 | 27.5 | 25.3 |
| Dissolved Oxygen (mg/l) | 4.45 | 6.37 | 2.52 |
| BOD (mg/l) | 5.15 | 5.43 | 4.87 |
| Fecal (cols/ 100 ml) | 4475 | 8700 | 250 |
| Streptococci (cols/ 100 ml) | 3380 | 6500 | 260 |
| TSS (mg/l) | 14 | 14 | |
| pH (su) | 7.90 | 7.92 | 7.88 |
| Salinity (ppt) | 0 | 0 | 0 |
| Nitrate (mg/l) | 0.01 | 0.01 | 0.01 |
| Phosphates (mg/l) | 0.05 | 0.08 | 0.02 |
| | | | |
| **Sediment 2001** | | | |
| Sodium (mg/kg) | 2020 | 2020 | |
| Aluminum (mg/kg) | 19500 | 19500 | |
| Arsenic (mg/kg) | 1.5 | 1.5 | |
| Barium (mg/kg) | 99.3 | 99.3 | |
| Calcium (mg/kg) | 65900 | 65900 | |
| Cadmium (mg/kg) | 0.7 | 0.7 | |
| Cobalt (mg/kg) | 14.8 | 14.8 | |
| Chromium (mg/kg) | 9.5 | 9.5 | |
| Copper (mg/kg) | 52.5 | 52.5 | |
| Iron (mg/kg) | 12400 | 12400 | |
| Magnesium (mg/kg) | 5490 | 5490 | |
| Manganese (mg/kg) | 809 | 809 | |
| Lead (mg/kg) | 25 | 25 | |
| Strontium (mg/kg) | 1270 | 1270 | |
| Titanium (mg/kg) | 16.8 | 16.8 | |
| Vanadium (mg/kg) | 43.3 | 43.3 | |
| Zinc (mg/kg) | 34 | 34 | |
| Mercury (mg/kg) | 0.08 | 0.08 | |
| Phosphorous (mg/kg) | 1360 | 1360 | |

# ATTACHMENT 16D
# COMPARISON OF SURFACE WATER AND SEDIMENT QUALITY, SPRINGS 2002

| **Surface Water Apr-02** | **Average** | **1A** | **2A** |
|---|---|---|---|
| Ammonia | 0.021 | 0.011 | 0.03 |
| Temperature (deg C) | 30.8 | 31.7 | 29.9 |
| Dissolved Oxygen (mg/l) | 6.73 | 7.31 | 6.15 |
| BOD (mg/l) | 7.87 | 7.32 | 8.41 |
| Fecal (cols/ 100 ml) | 978 | 902 | 1053 |
| Streptococci (cols/ 100 ml) | 174 | 109 | 239 |
| TSS (mg/l) | 11 | 6 | 16 |
| pH (su) | 8.20 | 8.37 | 8.03 |
| Salinity (ppt) | 1.17 | 1.28 | 1.05 |
| Sodium (mg/l) | 252 | 250 | 254 |
| Nitrate (mg/l) | <0.02 | <0.02 | <0.02 |
| Phosphates (mg/l) | <0.005 | <0.005 | <0.005 |
| Copper (mg/l) | 0.0030 | 0.0027 | 0.0032 |
| Iron (mg/l) | 0.110 | 0.105 | 0.114 |
| Potassium (mg/l) | 10 | 10 | 10 |
| Magnesium (mg/l) | 58.7 | 58.5 | 58.8 |
| Sodium (mg/l) | 252 | 250 | 254 |
| Lead (mg/l) | <0.0005 | <0.0005 | <0.0005 |
| Mercury (mg/l) | <0.00005 | <0.00005 | <0.00005 |
| Zinc (mg/l) | <0.005 | <0.005 | <0.005 |
| | | | |
| **Sediment Dec 02** | | | |
| Sodium (mg/kg) | 2605 | 2490 | 2720 |
| Aluminum (mg/kg) | 24150 | 24300 | 24000 |
| Arsenic (mg/kg) | 2.5 | 3.1 | 1.8 |
| Barium (mg/kg) | 69 | 67.7 | 71.1 |
| Calcium (mg/kg) | 115150 | 149000 | 81300 |
| Cadmium (mg/kg) | 0.48 | 0.52 | 0.44 |
| Cobalt (mg/kg) | 10 | 8.7 | 11.5 |
| Chromium (mg/kg) | 10 | 9.8 | 9.5 |
| Copper (mg/kg) | 41 | 34.7 | 46.9 |
| Iron (mg/kg) | 17750 | 18100 | 17400 |
| Magnesium (mg/kg) | 7130 | 7290 | 6970 |
| Manganese (mg/kg) | 948 | 805 | 1090 |
| Lead (mg/kg) | 41 | 47.1 | 35.4 |
| Strontium (mg/kg) | 2870 | 3780 | 1960 |
| Titanium (mg/kg) | 82 | 103 | 60 |
| Vanadium (mg/kg) | 50 | 50 | 49 |
| Zinc (mg/kg) | 45.6 | 48.3 | 42.8 |
| Mercury (mg/kg) | <0.05 | <0.05 | <0.05 |

# ATTACHMENT 16D
# COMPARISON OF SURFACE WATER AND SEDIMENT QUALITY, SPRINGS 2010

**Feb-10**

| **Surface Water** | | **1** | **2A** |
|---|---|---|---|
| Ammonia as N (mg/l) | 0.141 | 0.091 | 0.19 |
| Temperature (deg C) | 26.0 | 25.7 | 26.3 |
| Dissolved Oxygen (mg/l) | 1.79 | 2.56 | 1.02 |
| BOD (mg/l) | 5.88 | 7.38 | 4.38 |
| Fecal (cols/ 100 ml) | 460 | 460 | 460 |
| Streptococci (cols/ 100 ml) | 565 | 630 | 500 |
| Enterococci (cols/ 100 ml) | 360 | 240 | 480 |
| TSS (mg/l) | 22 | 32 | 11 |
| pH (su) | 7.54 | 7.67 | 7.40 |
| Salinity (ppt) | 0.6 | 0.6 | 0.5 |
| Sodium (mg/l) | 98 | 110 | 85 |
| Nitrate (mg/l) | 0.17 | <0.1 | ~0.33 |
| Phosphorous (mg/l) | 0.16 | ~0.13 | ~0.21 |
| Copper (mg/l) | 0.004 | ~0.0045 | ~0.0034 |
| Iron (mg/l) | 1.35 | 1.5 | 1.2 |
| Potassium (mg/l) | 10 | 12 | 8.2 |
| Magnesium (mg/l) | 35 | 37 | 32 |
| Sodium (mg/l) | 98 | 110 | 85 |
| Lead (mg/l) | <0.002 | <0.002 | <0.002 |
| Mercury (mg/l) | <0.000072 | <0.000072 | <0.000072 |
| Zinc (mg/l) | 0.029 | 0.033 | 0.024 |
| Nitrite as N (mg/l) | <0.1 | <0.1 | <0.1 |
| Sulfate (mg/l) | 48 | 50 | 45 |
| Sulfide (mg/l) | <1.0 | <1.0 | <1.0 |
| COD (mg/L) | 30 | 44 | ~15 |
| Alkalinity (mg/l) | 275 | 210 | 340 |
| Chloride (mg/l) | 115 | 140 | 89 |
| Tannins and Lignins (mg/L) | 0.8 | 0.92 | 0.7 |
| Chlorophyll A (ug/l) | 81 | 137 | 25.3 |
| Turbidity (NTU) | 8 | 11 | 4.9 |
| CO2 (ug/l) | 165 | 130 | 200 |
| | | | |
| **Sediment** | | | |
| pH (su) | 8.0 | 7.89 | 8.11 |
| Nitrate (mg/kg) | <1.0 | <1.0 | <1.0 |
| Phosphorous (mg/kg) | 1495 | 690 | 2300 |
| Sodium (mg/kg) | 595 | 300 | 890 |
| Aluminum (mg/kg) | 9400 | 9700 | 9100 |
| Arsenic (mg/kg) | 0.7 | 0.54 | 0.78 |
| Barium (mg/kg) | 20 | 18 | 21 |
| Calcium (mg/kg) | 57500 | 23000 | 92000 |
| Cadmium (mg/kg) | 0.22 | ~0.18 | ~0.26 |
| Cobalt (mg/kg) | 2.7 | 3.4 | 2 |
| Chromium (mg/kg) | 4.4 | 4.1 | 4.7 |
| Copper (mg/kg) | 14.5 | 17 | 12 |
| Iron (mg/kg) | 5550 | 6200 | 4900 |
| Magnesium (mg/kg) | 1900 | 1700 | 2100 |
| Manganese (mg/kg) | 185 | 200 | 170 |
| Lead (mg/kg) | 11.5 | 9.9 | 13 |
| Strontium (mg/kg) | 1755 | 810 | 2700 |
| Titanium (mg/kg) | 99 | 68 | 130 |
| Vanadium (mg/kg) | 15 | 14 | 16 |
| Zinc (mg/kg) | 14 | 15 | 13 |
| Mercury (mg/kg) | 0.021 | ~0.019 | 0.023 |
| Ammonia as N (mg/kg) | 34 | 65 | 2.1 |
| Total Phosphorous (mg/kg) | 1495 | 690 | 2300 |
| Orthophosphorous (mg/l) | 2.6 | ~1.6 | 3.5 |
| Sulfate (mg/kg) | <100 | <100 | <100 |
| Sulfide (mg/kg) | 36 | 47 | 25 |
| TOC (mg/kg) | 38500 | 42000 | 35000 |

## ATTACHMENT 16E
## COMPARISON OF SURFACE WATER AND SEDIMENT QUALITY, EASTERN OFFSITE 2001

| **Surf. Wat. Feb/Mar/ Apr-01** | **Average** | **9** | **12** |
|---|---|---|---|
| Ammonia (mg/l) | 0.04 | 0.04 | n/a |
| Temperature (deg C) | 28.2 | 27.4 | 28.9 |
| Dissolved Oxygen (mg/l) | 7.335 | 3.26 | 11.41 |
| BOD (mg/l) | 9.34 | 0.75 | 17.93 |
| Fecal (cols/ 100 ml) | 295 | 440 | 150 |
| Streptococci (cols/ 100 ml) | 455 | 510 | 400 |
| TSS (mg/l) | 8.5 | 3 | 14 |
| pH (su) | 7.98 | 7.62 | 8.34 |
| Salinity (ppt) | 0.15 | 0.3 | 0 |
| Nitrate (mg/l) | 2.36 | 4.72 | <.01 |
| Phosphates (mg/l) | 0.08 | 0.13 | 0.03 |
| | | | |
| **Sediment 2001** | | | |
| Sodium (mg/kg) | 2020 | 2020 | |
| Aluminum (mg/kg) | 7050 | 7050 | |
| Arsenic (mg/kg) | 3.9 | 3.9 | |
| Barium (mg/kg) | 44.3 | 44.3 | |
| Calcium (mg/kg) | 179000 | 179000 | |
| Cadmium (mg/kg) | 0.5 | 0.5 | |
| Cobalt (mg/kg) | 2.5 | 2.5 | |
| Chromium (mg/kg) | 70.3 | 70.3 | |
| Copper (mg/kg) | 54.2 | 54.2 | |
| Iron (mg/kg) | 6180 | 6180 | |
| Magnesium (mg/kg) | 6670 | 6670 | |
| Manganese (mg/kg) | 77.1 | 77.1 | |
| Lead (mg/kg) | 55 | 55 | |
| Strontium (mg/kg) | 5730 | 5730 | |
| Titanium (mg/kg) | 0.5 | 0.5 | |
| Vanadium (mg/kg) | 108 | 108 | |
| Zinc (mg/kg) | 198 | 198 | |
| Mercury (mg/kg) | 0.11 | 0.11 | |
| Phosphorous (mg/kg) | 2410 | 2410 | |

# ATTACHMENT 16E
# COMPARISON OF SURFACE WATER AND SEDIMENT QUALITY, EASTERN OFFSITE 2002

| **Surface Water Apr-02** | **Average** | **9** | **12** |
|---|---|---|---|
| Ammonia | 0.045 | 0.017 | 0.072 |
| Temperature (deg C) | 29.9 | 27.3 | 32.5 |
| Dissolved Oxygen (mg/l) | 5.16 | 3.22 | 7.09 |
| BOD (mg/l) | 8.83 | 9.58 | 8.07 |
| Fecal (cols/ 100 ml) | 644 | 962 | 326 |
| Streptococci (cols/ 100 ml) | 383 | 494 | 272 |
| TSS (mg/l) | 20 | 10 | 30 |
| pH (su) | 7.84 | 7.53 | 8.15 |
| Salinity (ppt) | 2.09 | 0.6 | 3.58 |
| Sodium (mg/l) | 677 | 104 | 1250 |
| Nitrate (mg/l) | 5.3 | 10.6 | <0.02 |
| Phosphates (mg/l) | 0.019 | 0.037 | <0.005 |
| Copper (mg/l) | 0.0064 | 0.0018 | 0.011 |
| Iron (mg/l) | 0.07 | 0.05 | 0.088 |
| Potassium (mg/l) | 29 | 7 | 51 |
| Magnesium (mg/l) | 102 | 38 | 166 |
| Sodium (mg/l) | 677 | 104 | 1250 |
| Lead (mg/l) | 0.001 | <0.0005 | 0.0021 |
| Mercury (mg/l) | <0.00005 | <0.00005 | <0.00005 |
| Zinc (mg/l) | 0.004 | 0.008 | <0.005 |
| | | | |
| **Sediment Dec 02** | | | |
| Sodium (mg/kg) | 3700 | 1600 | 5800 |
| Aluminum (mg/kg) | 13900 | 11400 | 16400 |
| Arsenic (mg/kg) | 2.7 | 2.3 | 3.1 |
| Barium (mg/kg) | 73 | 69.1 | 77 |
| Calcium (mg/kg) | 270500 | 275000 | 266000 |
| Cadmium (mg/kg) | 0.37 | 0.33 | 0.41 |
| Cobalt (mg/kg) | 3.1 | 2.9 | 3.2 |
| Chromium (mg/kg) | 20.5 | 24.7 | 16.2 |
| Copper (mg/kg) | 25.3 | 27.7 | 22.8 |
| Iron (mg/kg) | 9905 | 9610 | 10200 |
| Magnesium (mg/kg) | 11800 | 8400 | 15200 |
| Manganese (mg/kg) | 143 | 111 | 175 |
| Lead (mg/kg) | 105.6 | 91.2 | 120 |
| Strontium (mg/kg) | 6400 | 4280 | 8520 |
| Titanium (mg/kg) | 110 | 87 | 133 |
| Vanadium (mg/kg) | 72 | 97 | 47 |
| Zinc (mg/kg) | 52.6 | 76.3 | 28.9 |
| Mercury (mg/kg) | <0.05 | <0.05 | <0.05 |

# ATTACHMENT 16E
# COMPARISON OF SURFACE WATER AND SEDIMENT QUALITY, EASTERN OFFSITE 2010

**Feb-10**

| **Surface Water** | | **9A** | **13** | **14** |
|---|---|---|---|---|
| Ammonia as N (mg/l) | 0.14 | 0.1 | 0.12 | 0.19 |
| Temperature (deg C) | 26.7 | 26.3 | 26.2 | 27.7 |
| Dissolved Oxygen (mg/l) | 2.18 | 1.62 | 2.50 | 2.42 |
| BOD (mg/l) | 1.63 | <2.00 | 2.16 | 2.73 |
| Fecal (cols/ 100 ml) | 290 | 600 | 40 | 230 |
| Streptococci (cols/ 100 ml) | 790 | 240 | 130 | 2000 |
| Enterococci (cols/ 100 ml) | 610 | 79 | 150 | 1600 |
| TSS (mg/l) | 66 | 16 | 31 | 150.0 |
| pH (su) | 7.46 | 7.55 | 7.53 | 7.31 |
| Salinity (ppt) | 0.7 | 0.8 | 0.5 | 0.8 |
| Sodium (mg/l) | 177 | 210 | 110 | 210 |
| Nitrate (mg/l) | 2.04 | <0.10 | 5.8 | ~0.33 |
| Phosphorous (mg/l) | <0.10 | <0.10 | <0.10 | <0.10 |
| Copper (mg/l) | <0.0029 | <0.0029 | <0.0029 | <0.0029 |
| Iron (mg/l) | 0.26 | ~0.12 | 0.34 | 0.33 |
| Potassium (mg/l) | 16 | 17 | 11 | 20 |
| Magnesium (mg/l) | 45 | 41 | 42 | 53 |
| Sodium (mg/l) | 177 | 210 | 110 | 210 |
| Lead (mg/l) | <0.0020 | <0.0020 | <0.0020 | <0.0020 |
| Mercury (mg/l) | <0.000072 | <0.000072 | <0.000072 | <0.000072 |
| Zinc (mg/l) | 0.023 | 0.022 | ~0.018 | 0.03 |
| Nitrite as N (mg/l) | 0.05 | <0.10 | ~0.16 | <0.10 |
| Sulfate (mg/l) | 77 | 69 | 71 | 90 |
| Sulfide (mg/l) | <1.0 | <1.0 | <1.0 | <1.0 |
| COD (mg/L) | 17 | 20 | <10 | 30 |
| Alkalinity (mg/l) | 293 | 290 | 280 | 310 |
| Chloride (mg/l) | 263 | 340 | 160 | 290 |
| Tannins and Lignins (mg/L) | 0.9 | 1.2 | 0.5 | 1.0 |
| Chlorophyll A (ug/l) | 36 | 29.6 | 14.9 | 64.2 |
| Turbidity (NTU) | 34 | 5.7 | 17 | 79 |
| CO2 (ug/l) | 137 | 130 | 110 | 170 |
| | | | | |
| **Sediment** | | | | |
| pH (su) | 7.41 | | 7.41 | |
| Nitrate (mg/kg) | <1.0 | | <1.0 | |
| Phosphorous (mg/kg) | 360 | | 360 | |
| Sodium (mg/kg) | 430 | | 430 | |
| Aluminum (mg/kg) | 4200 | | 4200 | |
| Arsenic (mg/kg) | 0.57 | | 0.57 | |
| Barium (mg/kg) | 19 | | 19 | |
| Calcium (mg/kg) | 60,000 | | 60,000 | |
| Cadmium (mg/kg) | ~0.097 | | ~0.097 | |
| Cobalt (mg/kg) | ~0.83 | | ~0.83 | |
| Chromium (mg/kg) | 4.2 | | 4.2 | |
| Copper (mg/kg) | 6 | | 6 | |
| Iron (mg/kg) | 2500 | | 2500 | |
| Magnesium (mg/kg) | 2100 | | 2100 | |
| Manganese (mg/kg) | 53 | | 53 | |
| Lead (mg/kg) | 5.4 | | 5.4 | |
| Strontium (mg/kg) | 3100 | | 3100 | |
| Titanium (mg/kg) | 43 | | 43 | |
| Vanadium (mg/kg) | 6.4 | | 6.4 | |
| Zinc (mg/kg) | 21 | | 21 | |
| Mercury (mg/kg) | 0.023 | | 0.023 | |
| Ammonia as N (mg/kg) | 46 | | 46 | |
| Total Phosphorous (mg/kg) | 360 | | 360 | |
| Orthophosphorous (mg/l) | ~1.3 | | ~1.3 | |
| Sulfate (mg/kg) | <100 | | <100 | |
| Sulfide (mg/kg) | <25 | | <25 | |
| TOC (mg/kg) | 57000 | | 57000 | |

# ATTACHMENT 17

## Pesticide Uses, Effects and Standards

# ATTACHMENT 17
# PESTICIDE USES, EFFECTS AND STANDARDS

| Compound | Target Organ | Use | Barbados Proposed Marine Std | Florida SW Std. FDEP Rule 62-302 | Florida GW Cleanup Target Level |
|---|---|---|---|---|---|
| Dieldrin | Carcinogen - Liver | Insecticide used extensively on crops such as cotton from the 1950's | Any Laboratory Detection | <0.00014 ug/l | 0.002 ug/l |
| | | and for termites, Barbados asceeded to the Stockholm Convention on | | | |
| | | Persistent Organic Chemicals (POPs), banning their use, in 1984 | | | |
| | | Fish or animals that eat dieldrin-contaminated materials store a large amount | | | |
| | | of the dieldrin in their fat. Animals or fish that eat other animals have levels | | | |
| | | of dieldrin in their fat many times higher than animals or fish that eat plants. | | | |
| | | | | | |
| Chlordane | Carcinogen - Liver | Similar to dieldrin | Any Laboratory Detection | <0.00059 ug/l | 2* ug/l |
| | | | | | |
| Malathion | Neurological | Commonly used to control mosquitoes and a variety of insects that attack | Any Laboratory Detection | 0.1 ug/l | 140 ug/l |
| | | fruits, vegetables, landscaping plants, and shrubs | | | |
| | | | | | |
| | | | | | |
| 4,4 DDE | Carcinogen | Biodegradation product of DDT. DDT was commonly used on cotton, field crops | Any Laboratory Detection | N/A | 0.1 ug/l |
| | | vegetables and livestock. DDT is part of the Stockholm Convention on POPs | | | |
| | | | | | |
| Heptachlor epoxide | Carcinogen - Liver | Heptachlor epoxide is formed when heptachlor breaks down in the environment. | Any Laboratory Detection | N/A | 0.2* ug/l |
| | | Heptachlor is used primarily against soil insects and termites, but also against | | | |
| | | cotton insects, grasshoppers, and malaria mosquitoes | | | |
| | | Heptachlor is part of the Stockholm Convention on POPs | | | |

* - Florida Drinking Water Standard

# ATTACHMENT 18

## Benthic Analysis
## Terra Environmental Report

# Analysis of Benthic Samples Collected from the Graeme Hall Nature Preserve, Barbados

Submitted to:
Environmental Engineering Consultants, Inc.
5119 N. Florida Avenue
Tampa, Florida 33603

Submitted by:
Terra Environmental Services, Inc.
101 16th Avenue S.
Suite 4
St. Petersburg, Florida 33701

TERRA
Environmental Services, Inc.
Marine Center

April 9, 2010

## BACKGROUND

Terra Environmental Services, Inc. (Terra) was contracted by Environmental Engineering Consultants, Inc. (EEC) to process and analyze benthic grab samples collected from the lagoon located in the Graeme Hall Nature Preserve, Barbados, as part of a comprehensive assessment of current environmental conditions in the Preserve. The Graeme Hall Nature Preserve supports the only red mangrove (*Rhizophora mangle*) and herbaceous marsh community in Barbados (Ramcharan, 2005). Although originally open to the ocean, tidal flow into the lagoon has been reduced over time.

Samples were collected by EEC from 10 locations throughout the preserve (see map) on February 11 and 12, 2010 with a petite ponar grab sampler (0.023 $m^2$) deployed from a small boat. At each location, replicate grab samples of sediment were collected. One replicate was sieved (500 μm) and fixed with 10% buffered formalin for identification and enumeration of benthic macroinvertebrates. The second replicate (unsieved and not fixed) was collected for sediment analysis (grain size, calcium carbonate, and total organic matter).

Samples were received by Terra on February 16, 2010. Analysis of sediment characteristics was performed at the Eckerd College Sediment Laboratory, under the direction of Dr. Gregg Brooks.

## METHODS

### Benthic Macroinvertebrates

In the laboratory, samples were rinsed to remove formalin and separated (with sieves) into "coarse" (>5 mm) and "fine" (>500 μm) fractions. Aliquots of material (organisms and sediment) were placed onto 18" x 14" fiberglass sorting trays and examined closely; organisms were carefully removed with forceps and placed into one of four labeled vials (Annelids, Molluscs, Arthropods, and Other) containing 70% ethanol. This process was repeated until the entire sample was sorted.

Following sorting, organisms were enumerated and identified to the lowest practical taxonomic level using appropriate taxonomic keys, and results were recorded on laboratory bench sheets and entered into Excel spreadsheets.

A diversity index is a statistic intended to measure the biodiversity of an ecosystem. The simplest estimate of diversity is species richness (S), calculated as the number of identified species (or in this case, taxa). The higher the value of S, the greater the diversity. Species richness, however, does not consider the relative abundances of the various taxa. Shannon's Diversity Index (H') takes into account both the number of species and the evenness of the species (how the number of individuals is distributed among the taxa). Thus the index is increased by either having more species or a greater evenness. Similarly, Simpson's Diversity Index (1-D) takes into account both the number of species and the relative abundance of each species. It can range from 0 (no diversity) to 1 (infinite diversity). The Bray-Curtis Similarity is a statistic used to quantify the compositional similarity (based on common taxa) among sampling sites. A value of 0 indicates two sites have no shared species and a value of 1 indicates that two sites have the same composition. For this project, Shannon's Index (H') and Simpson's Index (1-D) values were calculated for each station and a Bray-Curtis similarity dendogram was produced using the PAST statistical software package.

### Sedimentology

Grain size was determined by initially wet sieving the sample through a 63 µm screen. The sand and gravel-size (>63 µm) fractions were then analyzed using a settling tube (Gibbs, 1974), and the percentage of each size interval within the sand/gravel fraction was calculated using the settling rate (Stoke's Law). The fine-size (<63 µm) fractions were also determined based on settling rates using a pipette (Folk, 1965). From this the percentages of silt and clay-size sediments were calculated. Data from both analyses were combined, and results were expressed as mean grain size, % gravel, % sand, % silt ,% clay and % mud (silt+clay). Note, mean grain size is expressed in phi ($\Phi$) units, where $\Phi = -\log_2$ (grain diameter in mm). Hence, the larger the $\Phi$ value the finer the grain size. For reference, the sand/mud boundary is 4 $\Phi$.

Calcium carbonate content was determined by the acid leaching method of Milliman (1974). A 10% hydrochloric acid solution was added to a pre-weighed sample. After the reaction reached completion (all calcium carbonate was dissolved), each sample was washed four times, dried and weighed again. The difference in weight represented the calcium carbonate fraction.

Total organic matter (TOM) was determined as weight loss on ignition (Dean, 1974). Approximately 1.0 g of insoluble residue (i.e. the sediment remaining after acid leaching) was ashed in a muffle furnace at 550° C for at least 2.5 hours. The sample was weighed again and the difference in weight represented the total organic matter in the sample.

## RESULTS

### Benthic Macroinvertebrates

A total of 777 benthic macroinvertebrates comprising 17 taxa was identified in the ten samples (Table 1). Only two taxa were recovered from Station B-9. The greatest number of taxa (seven) was found at Station B-8. The greatest number of individuals (244) occurred at Station B-7 and the lowest number of individuals (seven) was found at Station B-2. Accordingly, the number of individuals $m^{-2}$ ranged from 304 at Station B-2 to 10,609 at Station B-7 (Table 2). The average density of organisms (all stations) was 3,378 individuals $m^{-2}$.

Of the 17 taxa identified, eight were Annelids (oligochaetes), four were Molluscs (gastropods), and five were Arthropods (insect larvae).

Biodiversity values are summarized in Table 2. The lowest biodiversity occurred at Station B-9, which had the fewest number of taxa (2), the lowest Shannon Index (0.133), and the lowest Simpson Index (0.057). The greatest biodiversity was found at Station B-4, where Shannon's Index was 1.257 and Simpson's Index was 0.656.

Calculation of the Bray-Curtis Similarity Index revealed that Stations B-6 and B-10 were most similar and Stations B-6, B-7, B-8, B-9, and B-10 were more similar than the other stations (Figure 1).

### Sedimentology

Results of the sediment analyses are provided in Table 3. Although there was a fair amount of variability, the sediments of the Graeme Hall lagoon were relatively fine, had a high organic content and a high carbonate content. The mean phi value was over 4.0 at six of the ten stations, and ranged from 2.2 to 7.5. Total organic matter ranged from 5.3 to 41.3 percent. Percent carbonate ranged from 43.1 to 86.7.

## SYNTHESIS

The benthic macroinvertebrates found in the Graeme Hall Nature Preserve lagoon were exclusively freshwater taxa, primarily oligochaetes, gastropods, and chironomids (larval insects). This was supported by the field measurements of salinity, which ranged from 0.9 to 2.0 ppt at the ten locations.

The number of taxa collected in the samples and both Shannon and Simpson diversity indices all indicate a relatively low biodiversity in the Graeme Hall lagoon. According to Bass (2003), however, this is not unusual for freshwater communities on small Caribbean islands, such as Barbados, given their small size, isolated nature, and frequent disturbances to freshwater environments. There is evidence of sudden disturbance to the freshwater community of the Graeme Hall Nature Preserve. Eight of the ten samples examined for this project contained numerous dead gastropod shells (mostly *Melanoides tuberculatus* and *Hydrobiidae* spp.) that appeared to be in otherwise good condition. This might be the result of low dissolved oxygen levels occurring at night and exacerbated by the high organic content of sediments and high water temperature.

The most similar stations (B-6 through B-10), as indicated by the Bray-Curtis analysis, were all located in the central portion of the lagoon. The remaining stations were in surrounding canals. Station B-2, located far up the canal on the eastern side of the lagoon had the greatest diversity and was least similar to all other stations, probably because of its relatively isolated location.

The sediment analyses supported the taxonomy. The high organic content was observed as leaves and filamentous algae. The high carbonate content in several of the samples could be attributed at least in part to the large number of gastropod shells. The station with the highest carbonate content (B-1) was located in the canal closest to the original connection to the ocean, so it is also possible that most, if not all of the carbonates were deposited as marine sediments before the tidal flow was restricted. The relatively small grain size overall is indicative of sediment derived from land drainage and poor circulation in the lagoon itself. The station with the highest percent mud was station B-5, located in the northeastern corner of the lagoon where there is probably minimal circulation. Station B-3 had the highest organic content, possibly because of its location in a restricted portion (southwest corner) of the canal surrounding that portion of the lagoon.

The lagoon in the Graeme Hall Nature Preserve originated as a marine embayment that supported establishment of the red mangrove community (Ramcharan, 2005). Over time, connectivity to the ocean has been reduced by natural and anthropogenic processes. At present, the lagoon supports a freshwater benthic community that is typical of a pond or lagoon on a Caribbean island characterized by high organic input and poor circulation, resulting in low biodiversity (Bass, 2003). If connectivity to the ocean were re-established, it is likely that the biodiversity of the lagoon would increase. For example, Sheridan (1997) examined the benthos of red mangrove and associated habitats in Rookery Bay, Florida, and found over 300 taxa at densities averaging from 22,591 to 52,914 individuals $m^{-2}$. Red mangroves communities normally function to provide high densities of small prey items for mobile consumers, including commercially important species such as oysters, blue crabs, pink shrimp, mullet, and snook (Odum et al., 1982).

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## Table 1.

## Numbers of benthic macroinvertebrates by taxa found at each station in the Graeme Hall Nature Preserve

| Taxa | Phylum | B-1 | B-2 | B-3 | B-4 | B-5 | B-6 | B-7 | B-8 | B-9 | B-10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Tubificoid Naididae spp.* | Annelida | 20 | | 212 | 1 | | | | | | |
| *Limnodriloidinae spp.* | Annelida | 1 | | | | | | | | | |
| *Limnodrilus hoffmeisteri* | Annelida | | | 3 | | | | | | | |
| *Naidinae spp.* | Annelida | | 1 | | | | | 5 | 6 | | 2 |
| *Pristina nr. plumaseta* | Annelida | | | 4 | 6 | | | | | | 1 |
| *Dero furcata* | Annelida | | | | | | | | 1 | | |
| *Dero pectinata* | Annelida | | | | | 1 | 19 | 19 | 12 | 1 | 28 |
| *Dero nr. obtusa* | Annelida | | | | | | | 1 | 6 | | |
| *Haitia cubensis* | Mollusca | | 4 | | | | | | | | |
| *Pyrgophorus platyrachis* | Mollusca | 4 | | | | 4 | | 7 | 3 | | 3 |
| *Melanoides tuberculatus* | Mollusca | | | | 1 | | | | | | |
| *Planorbidae spp.* | Mollusca | | 1 | | | | | | | | |
| *Talitridae spp.* | Arthropoda | | | 1 | | | | | | | |
| *Hyalella spp.* | Arthropoda | | | | 12 | | | | | | |
| *Chironomidae spp.* | Arthropoda | | | | | | 1 | 9 | 1 | | 1 |
| *Chironomus spp.* | Arthropoda | | | | 4 | 8 | 35 | 203 | 63 | 33 | 25 |
| *Goeldichironomus spp.* | Arthropoda | | 1 | 3 | | | | | | | |

## Table 2.

## Number of macroinvertebrate taxa (S), individuals, individuals per m$^2$, Shannon's Diversity Index (H') and Simpson's Diversity Index (1-D) found at each station in the Graeme Hall Nature Preserve

| Parameter | B-1 | B-2 | B-3 | B-4 | B-5 | B-6 | B-7 | B-8 | B-9 | B-10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Number of Taxa | 3 | 4 | 5 | 5 | 3 | 3 | 6 | 7 | 2 | 6 |
| Number of Individuals | 25 | 7 | 223 | 24 | 13 | 55 | 244 | 92 | 34 | 60 |
| Shannon's Index (H') | 0.601 | 1.154 | 0.260 | 1.257 | 0.859 | 0.728 | 0.678 | 1.091 | 0.133 | 1.120 |
| Simpson's Index (1-D) | 0.333 | 0.612 | 0.096 | 0.656 | 0.521 | 0.475 | 0.299 | 0.504 | 0.057 | 0.604 |

## Table 3.

## Grain size, percent $CaCO_3$, and percent total organic matter for sediment collected at each benthic station

| Station | % Gravel | % Sand | % Silt | % Clay | % Mud | Mean Φ[*] | % $CaCO_3$ | % TOM |
|---|---|---|---|---|---|---|---|---|
| B-1 | 1.5 | 61.3 | 2.2 | 1.3 | 3.4 | 4.35 | 86.7 | 5.3 |
| B-2 | 0.0 | 89.3 | 0.3 | 0.3 | 0.6 | 2.75 | 85.8 | 11.3 |
| B-3 | 5.6 | 25.8 | 0.8 | 0.4 | 1.2 | 5.85 | 43.1 | 41.3 |
| B-4 | 15.2 | 41.6 | 1.6 | 0.8 | 2.4 | 3.91 | 81.6 | 14.9 |
| B-5 | 1.2 | 12.7 | 3.2 | 1.4 | 4.6 | 6.53 | 51.0 | 28.5 |
| B-6 | 4.6 | 10.9 | 0.5 | 0.9 | 1.5 | 7.45 | 46.6 | 31.8 |
| B-7 | 6.9 | 19.6 | 2.1 | 0.7 | 2.8 | 5.47 | 69.8 | 14.6 |
| B-8 | 2.2 | 80.5 | 1.3 | 0.8 | 2.1 | 2.97 | 84.9 | 5.8 |
| B-9 | 49.2 | 18.6 | 0.5 | 0.5 | 1.0 | 2.16 | 68.5 | 15.9 |
| B-10 | 21.4 | 30.2 | 1.6 | 0.7 | 2.3 | 4.04 | 52.7 | 25.7 |
| MAX | 49.2 | 89.3 | 3.2 | 1.4 | 4.6 | 7.5 | 86.7 | 41.3 |
| MIN | 0.0 | 10.9 | 0.3 | 0.3 | 0.6 | 2.2 | 43.1 | 5.3 |

[*] $\Phi = -\log_2$ (grain dia. in mm)

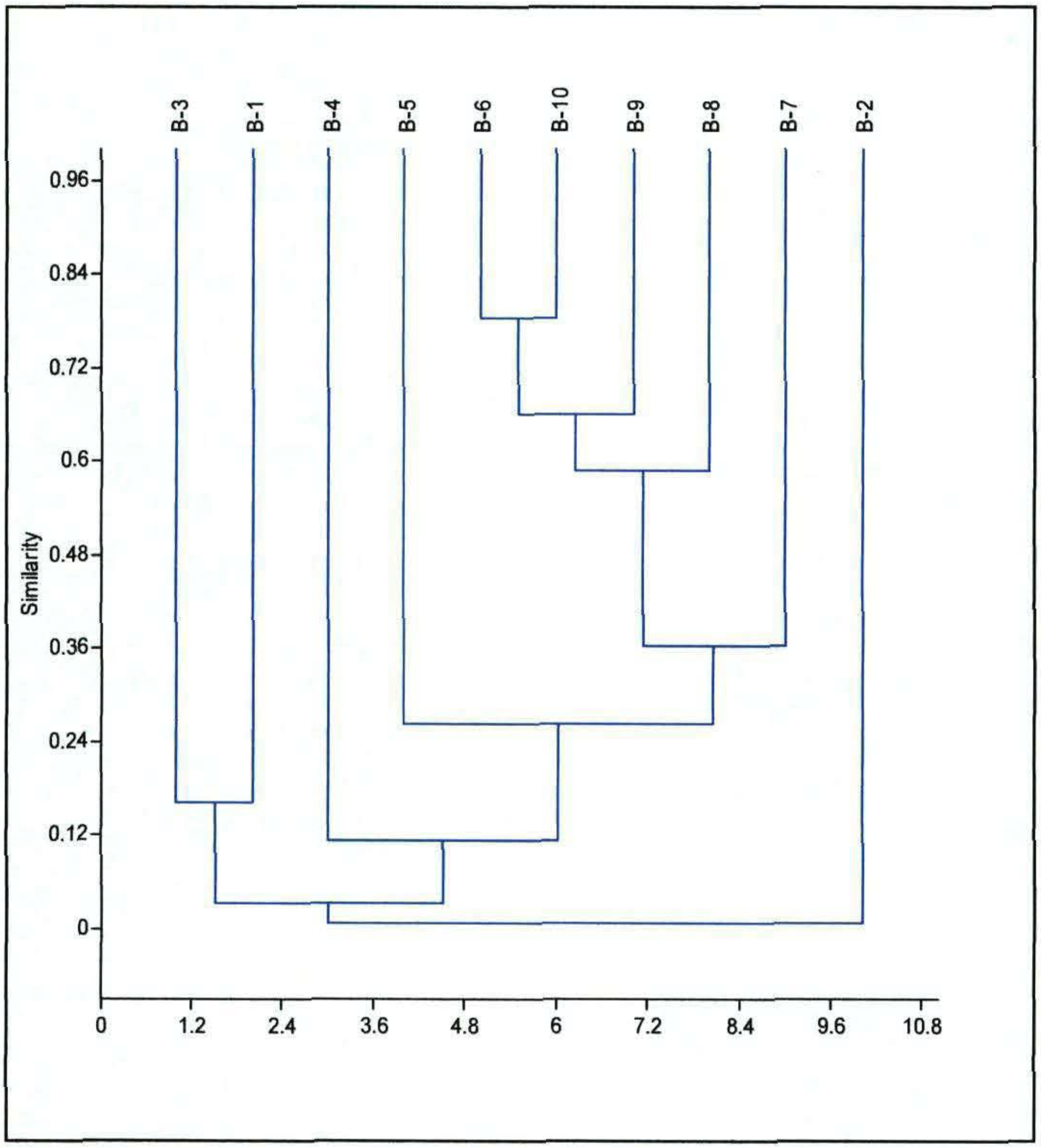

**Figure 1. Dendogram of Bray-Curtis Similarity Index based on distribution of macroinvertebrate taxa found at the Graeme Hall Nature Preserve**

# ATTACHMENT 19

## GHNS Biological Report Comments
## Regarding Fishkill Events 2000-2003

and

## Ryan Chenery Log of Fishkills 2006-2009

# ATTACHMENT
# FISH KILL DATA

| Date | Precipitation (mm) | Dead fish counted |
|---|---|---|
| May’00 | 90.44 | |
| June’00 | 74.66 | |
| July’00 | 92.72 | |
| August’00 | 69.84 | 8 |
| September’00 | 163.84 | 56 |
| October’00 | 108.99 | 128 |
| November’00 | 345.44 | |
| December | 134.89 | |
| January’01 | 33.78 | |
| February’01 | 43.42 | |
| March’01 | 5.84 | |
| April’01 | 18.53 | |
| May’01 | 41.42 | |
| June’01 | 61.62 | |
| July’01 | 258.84 | 36 |
| August’01 | 139.43 | |
| September’01 | 91.93 | 3000* |
| August'06 | 148.9 | 88 |
| August-October'07 | 489 | 110 |
| October'08 | 330.8 | 200 |
| Summer 2009 | n/a | 50 |

** 2010 Email from S. Heaslet*
*September, 2001: The recent fish kill appears to have been so dramatic because of changes in the water flow pattern of storm water drainage following works by the Drainage unit from the Ministry of Transport and Public Works earlier this year.*

*Evidence now indicates that oxygen depletion was the cause of the fish kill event. Tests of dissolved oxygen in the swamp on Monday showed extremely low levels of dissolved oxygen at the base of the lake. Further experiments showed that when sediment was stirred from the floor, an almost instant decrease on dissolved oxygen resulted. The primary cause of this effect would be the exposure of previously buried sediments to the water column, creating an instant increase in biological oxygen demand. A secondary effect from the stirring of these sediments being the exposure of additional nutrients creating increased aerobic bacterial growth. The new flow pattern of storm water drainage into the lake appears to have created significant disturbance to established layers of sediment from the eastern side of the swamp, with the freshly exposed sediment being carried into the lake.*

*It also appears that the new inflow pattern of this water into the lake had the effect of stirring the sediment from the floor of the lake itself resulting in the effects described above. These factors culminating in the death of up to 3,000 fish.*

*Sweeney (the Assistant Director of the Sanctuary at the time) commented on this subject“Given the complex problems of managing the swamp environment in a way that protectsnature and local biodiversity, but which also allows for the interests of other local stake holders to be taken into account, will require continued cooperation between the sanctuary and government environmental agencies and the future assistance of government when ecological problems are identified”.*

# ATTACHMENT

GHNS Biological Reports Notable Comments

| Date | Page | Topic | Noted or discussed |
|---|---|---|---|
| 08/00 | 5 | Fish | 8 dead fish. Rainfall had been heavy |
| 09/00 | 15 | Fish | 56 dead tilapia and tarpon “mainly in the lake and pond number one (which is connected to the lake. The fish were predominantly large fish (approximately 0.5 to 1.0 m in length) of tilapia species and tarpon species although some were not identified. More dead fish were found following heavy rainfall and the number decreased as the month progressed and the rainy conditions cleared.” |
| 09/00 | 18 | Fish & Analytics | Two tables: Fish kills & Water Quality Analysis |
| 10/00 | 9 | Fish | 128 dead “in the lake and the pond connected to the lake (see appendix 1). This generally follows heavy rainfall and high temperatures. The rainfall may increase mixing within the water column and hence the demand for oxygen, high water temperature is associated with reduced gas retention. These factors may have contributed to the death of the fish.” |
| 4/01 |  | Fish | No fish kill |
| 5/01 |  | Fish | No dead fish |
| 6/01 | 5 | Fish | “no major fish kill” |
| 7/01 | 4 | Fish | 36 dead tilapia |
|  |  |  |  |
| 04/00 | 8 | Effluent | Laundry |
| 04/00 | 12 | Table | List of wild plants |
| 05/00 | 7 | Bio-indicators | Discussed |
| 05/00 | 6-7 | Effluent | Section 2.1.2. “The biggest concern of the Site Biologist is that in the event of effluent outfall from the South Coast Sewerage Project into the Eastern side, sewage … can enter the west side more easily. In response to the concern about the holding container for the sewerage adjacent to the sluice gate in the event of an emergency…” |
| 05/00 |  | more |  |
| 06/00 | 5 | Effulent | laundry |
| 06/00 | 18 | Mangroves | Discussion of the “Ecological Significance and Uses” |
| 06/00 | 20 | Mangroves | Lists mangrove associates |
| 06/00 | 21 | Mongoose | Life history |
| 06/00 | 9 | Tadpoles | still present |
| 07/00 | 18<br>19 | History | Of Graeme Hall Swamp includes intro of tilapia in the 20’s and 50’s |
| 07/00 | 9 | Sluice gate | “Dr. Oxenford suggested that a flow meter on the sluice gate would determine the direction and velocity of |

| | | | |
|---|---|---|---|
| | | | water through the sluice gate.” |
| 08/00 | 5 | Fish | 8 dead fish. Rainfall had been heavy |
| 08/00 | | more | |
| 09/00 | 15 | Fish | 56 dead tilapia and tarpon “mainly in the lake and pond number one (which is connected to the lake. The fish were predominantly large fish (approximately 0.5 to 1.0 m in length) of tilapia species and tarpon species although some ere not identified. More dead fish were found following heavy rainfall and the number decreased as the month progressed and the rainy conditions cleared.” |
| 09/00 | 18 | Fish & Analytics | Two tables: Fish kills & Water Quality Analysis |
| 09/00 | | more | |
| 10/00 | 4 | Algae | “The aquatic areas are becoming overgrown with algae and water lilies.” |
| 10/00 | 8 | Ammonia | “Ammonia was added to the parameters (“to be investigated”) since birds produce a significant amount of uric acid in their waste for which ammonia is a component. Ammonia is also toxic in significant amounts.” |
| 10/00 | 10 | Birds | “There appear to be more ospreys…semi-palmated plovers…green-backed herons…great blue herons…and belted kingfishers…” |
| 10/00 | 9 | Fish | 128 dead “in the lake and the pond connected to the lake (see appendix 1). This generally follows heavy rainfall and high temperatures. The rainfall may increase mixing within the water column and hence the demand for oxygen, high water temperature is associated with reduced gas retention. These factors may have contributed to the death of the fish.” |
| 10/00 | 6 | Sampling | “The sampling regime was further altered following discussions with Prof. Wayne Hunte (Director, Natural Resources Management Unit, University of the West Indies)…” |
| 11/00 | 7 | Data | “data from the heavy metal and microbial analysis … will be displayed in a separate document…” |
| 11/00 | 4 | Sluice gate | “The sluice gate was open for some time and the water levels have dropped considerably with some loss of aquatic algae.” |
| 12/00 | 7 | Ammonia | Notes “some substations where high levels of ammonia” were measured “including substation 10, the egret roost. The faeces from the birds contain uric acid that is a source of ammonia via the nitrogen cycle.” |
| 12/00 | 4 | Ammonia & nitrate | More justification for modifications to tests |
| 12/00 | 6 | Ammonia | “The amounts of nitrate, ammonia and nitrite (not |

| | | | |
|---|---|---|---|
| | | nitrate & nitrite | measured) can vary depending on the amount of animals, nitrifying bacteria with the nitrogen cycle and the buffering capacity of the water. |
| 12/00 | 6 | Nitrate | Describes measurement methodology |
| 01/01 | 5 | Algae | Tray still overgrown with macro-algae |
| 1/01 | 5 | DO | Irregular DO readings |
| 2/01 | 5 | Data | Accuracy of new vs inaccuracy of old water quality data |
| 2/01 | 5 | DO | DO meter problems – data not provided |
| 3/01 | 5 | mangrove | Seedlings planted on boardwalk berm had died |
| 3/01 | 6 | Metals | Heavy metals were detected |
| 3/01 | 4 | mosquito | No larvae found – feeder ponds had dried up |
| 3/01 | 7 | Objectives | 1) Changes in water quality related to Sanctuary activities<br>2) Identify water quality of input sources<br>3) Compliance to relavent water quality standards |
| 3/01 | 6 | Recom-mendation | "Pesticides, herbicides and heavy metals should be scanned once again in the wet season" |
| 4/01 | 4 | data | Discussion about the inaccuracy of data. |
| 4/01 | | fish | No fish kill |
| 4/01 | | Water quality & swamp | Degraded swamp comment: "it would be rash to apply stringent (water quality) standards to a degraded swamp without further investigation."<br>Comment found |
| 5/01 | | fish | No dead fish |
| 5/01 | 3,4 | Questionable government comments | A BMT for the government of Barbados outlined the problems experienced on the South coast and gave recommendations for the restoration of coastal and associated habitats. It highlighted the problems facing the Sanctuary. "The document is strongly worded and there were some questionable statements, speculations and generalizations within the document pertaining to water quality, type of fish, function of the swamp and the connection to the sea." |
| 6/01 | 5 | fish | "no major fish kill" |
| 7/01 | 4 | fish | 36 dead tilapia |
| 07/05 | | | Several hundred thousand gallons of effluent discharged from WWTP |
| | | | |

Email from Stuart Heaslet:
* *September, 2001: The recent fish kill appears to have been so dramatic because of changes in the water flow pattern of storm water drainage following works by the Drainage unit from the Ministry of Transport and Public Works earlier this year.*

*Evidence now indicates that oxygen depletion was the cause of the fish kill event. Tests of dissolved oxygen in the swamp on Monday showed extremely low levels of dissolved* *oxygen at the base of the lake. Further experiments showed that when sediment was stirred from the floor, an almost instant decrease on dissolved oxygen resulted. The primary cause of this effect would be the exposure of previously buried sediments to the water column, creating an instant increase in biological oxygen demand. A secondary effect from the stirring of these sediments being the exposure of additional nutrients creating increased aerobic bacterial growth. The new flow pattern of storm water drainage into the lake appears to have created significant disturbance to established layers of sediment from the eastern side of the swamp, with the freshly exposed sediment being carried into the lake. It also appears that the new inflow pattern of this water into the lake had the effect of stirring the sediment from the floor of the lake itself resulting in the effects described above. These factors culminating in the death of up to 3,000 fish.*

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# Ryan Chenery's Log of Fish Kills
## 2006 - 2009

**From:** Ryan Chenery [redacted]
**Sent:** Thursday, April 08, 2010 7:58 PM
**To:** Richard pryor
**Subject:** RE: Septic

Hi Richard,
Stuart called to ask whether i had any info. on fish and crab kill numbers and dates.
My records show that there were fish kills in 2006, 2007 and 2008.
August 2006 --- 88 dead Tilapia
August - October 2007 --- 110 dead Tilapia
October 2008 --- 200 dead Tilapia
There was another fish kill in 2009 but i can't seem to find the numbers or date. But as i was the one who had to collect and dump the dead fish i do however have an idea of the numbers. c. 50 dead Tilapia were removed. All Tilapia died in the shallow side of the lake i.e. the area of water west of the boardwalk. The majority were fully grown adults.
In terms of crab deaths, the figures that i have state that between late April and early May -- 22 dead Blue Land Crabs were discovered in and around the canal by the office and along the path which runs from the gift shop and stretches towards the Migratory Exhibit. Between June and July a further 28 Blue Land Crabs died in the area behind Lucky Horseshoe and outside the office and in the parking lot.
Hope this is helpful.
Ryan

ATTACHMENT 20

University of Florida – Tilapia and Crab Analysis

Dr. Denise Petty - March 30, 2010

UF | UNIVERSITY of FLORIDA

**College of Veterinary Medicine**
Department of Large Animal Clinical Sciences
Finfish and Shellfish Health Laboratory

7922 NW 71st St.
PO Box 100136
Gainesville, FL 32653
352-273-3612 Phone
352-392-3672 Fax

March 30, 2010

Environmental Engineering Consultants
5119 N Florida Ave.
Tampa, FL 33603

Seven dead tilapia (appeared to be *Oreochromis mossambicus*) were submitted to my laboratory February 11, 2010. All 7 fish appeared to be in good body condition, ranging in total length from 210-335 mm, and in weight from 162-628 g. All fish had abrasions and associated scale loss just above the operculum (see Photo 1). One fish was missing one eye; however, the orbit did not appear to be inflamed. Otherwise, no significant lesions were observed on the external surface of the fish.

Microscopic examination:
All fish had excessive mucus on skin, fins and gills. This could be a result of handling. A moderate number of granular cells (white blood cells) and heavy amount of non-motile bacteria were observed on the gills of one fish. No parasites were observed on any external tissue. Low numbers of metacercariae (encysted trematode larvae) were observed in the mesentery, liver, spleen, and posterior kidney of all fish examined. Metacercariae are commonly found in most fish grown in the natural environment, whether wild or cultured, and rarely cause significant disease in the infested fish. Some species can potentially infect humans if fish are not properly cooked prior to consumption, but such infection is rarely reported in Central America. Species identification of metacercariae can be difficult and costly, so the risk of the ones seen in these fish is unknown. See the attached CDC document "Emerging Foodborne Trematodiasis" for more detailed information. When fish are properly cooked (155-165°F for 15 seconds according to CDC guidelines), metacercariae are rendered non-viable and no longer present a potential danger.

Small granulomas, low in number, were observed in the liver, spleen, anterior and posterior kidneys of all fish examined. All other organs of all fish examined appeared to be within normal limits.

Bacterial cultures of spleen and kidney of the tilapia were negative for growth.

Tissues were processed for histology using standard techniques, and evaluated under a light microscope. Except for granulomas in some organs, no significant lesions were observed. Bacteria were observed in some of the granulomas, so acid-fast stains were applied. No acid-fast positive bacteria were present. *Francisella* sp. is an emerging bacterial pathogen that has been detected in tilapia in Hawaii, Costa Rica, and other countries. It can cause acute or chronic disease, and typically results in severe granulomatous disease primarily in kidney and spleen, but can occur in other tissues. Specialized media and molecular techniques are required to confirm the presence of *Francisella* sp. The tilapia submitted to my lab did not present with obvious lesions, and the granulomas were small and probably had little impact on these particular animals.

Tissues from the tilapia were analyzed for lead, mercury, zinc, copper and toxic organic compounds (see attached lab reports). Zinc was higher than anticipated (91.82 ppm). In an experiment by Hilmy, *Tilapia zilli* were more susceptible to zinc toxicity when water temperature was 25°C, and less susceptible with lower water temperatures. Despite the zinc accumulation, the submitted tilapia did not appear to be affected; however, that may change during the summer with higher water temperatures. The levels of the other compounds tested were within normal limits or zero.

The tilapia tissues were also examined by electron microscopy for viral particles; none were observed.

Two land crabs *Cardiosoma guanhumi*, and tissues of one crab in 10% buffered formalin were received on February 17, 2010.

The tissues of the two land crabs were partially autolyzed. No significant pathogens were observed on light microscopy of crab tissues.

Bacterial cultures of the two land crabs were performed; an environmental organism (*Halomonas* sp.) was cultured from one crab. The culture from the other crab had no growth.

The fixed crab tissues were processed for histology using standard techniques. No significant lesions were observed, however many tissues were autolyzed.

Tissues from crabs were submitted for toxic organic compounds; results were negative (see attached lab report).

In conclusion, the tilapia appeared to be in good health, despite a mild granulomatous disease and zinc accumulation in the gills. No significant pathogens were observed in the land crabs, but their partially autolyzed condition complicates diagnosis.

Ideally, the tilapia and crabs should be analyzed during the summer months, when water temperatures may accelerate pathogen growth and zinc toxicity.

Sincerely,

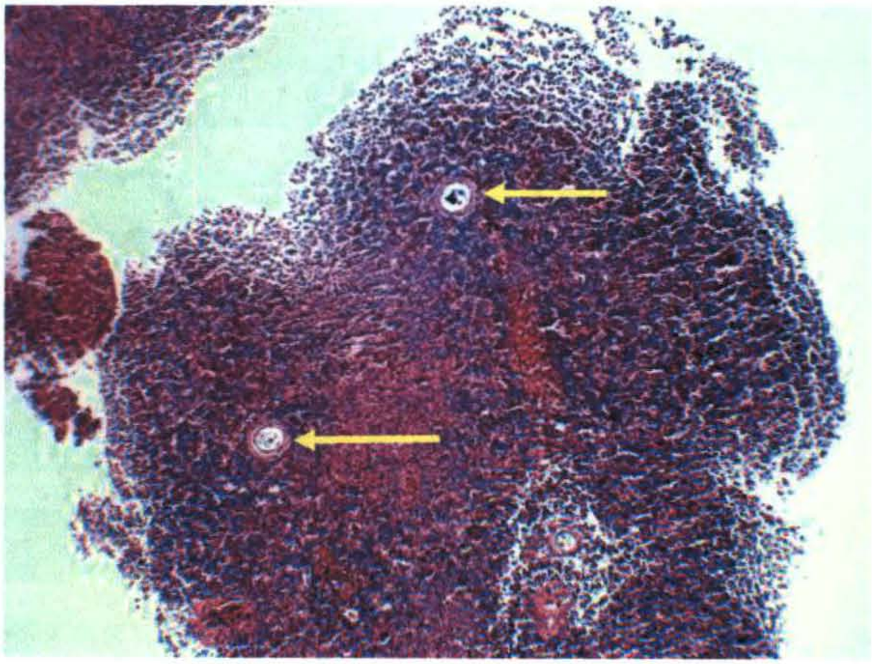
B. Denise Petty, DVM

Reference:

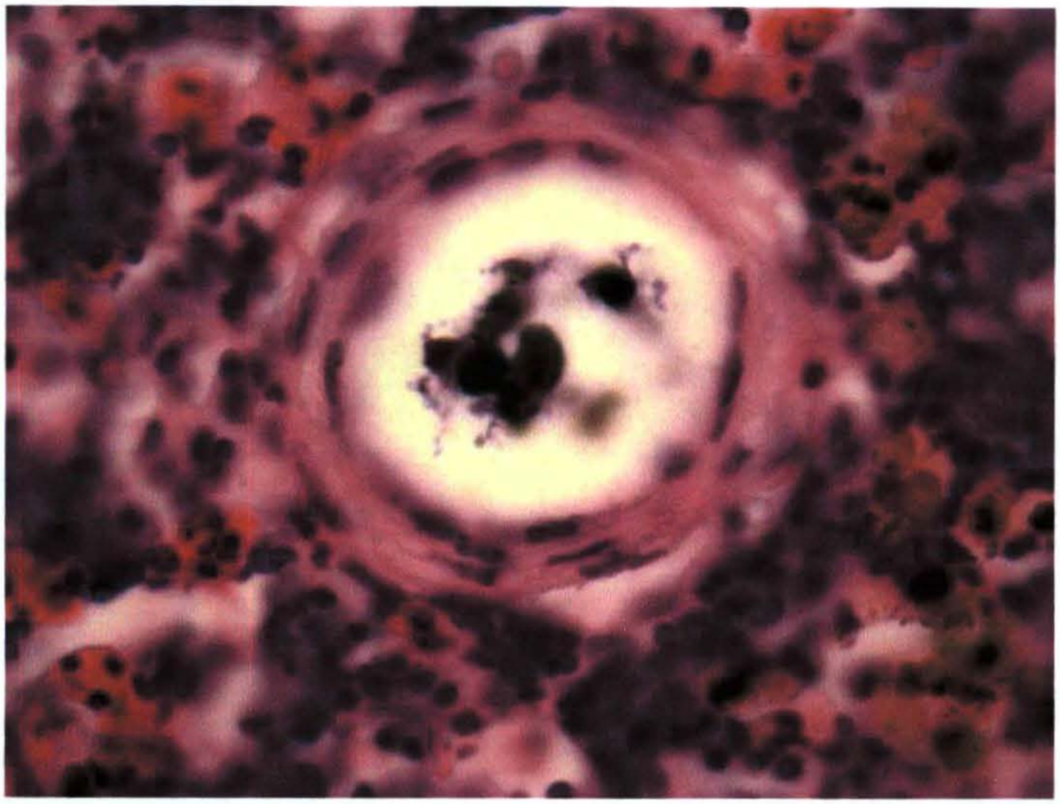
Center for Disease Control, HAACP Process 3.
http://www.cdc.gov/nceh/vsp/training/videos/activity/processthree.pdf

Hilmy AM, El-Domiaty NA, Daabees AY, Latifen HAA. Toxicity in *Tilapia zilli* and *Clarias lazera* (Pisces) induced zinc, seasonally, *Camp Biochem Physiol* Vol. 86C, No. 2, pp. 263-265, 1987

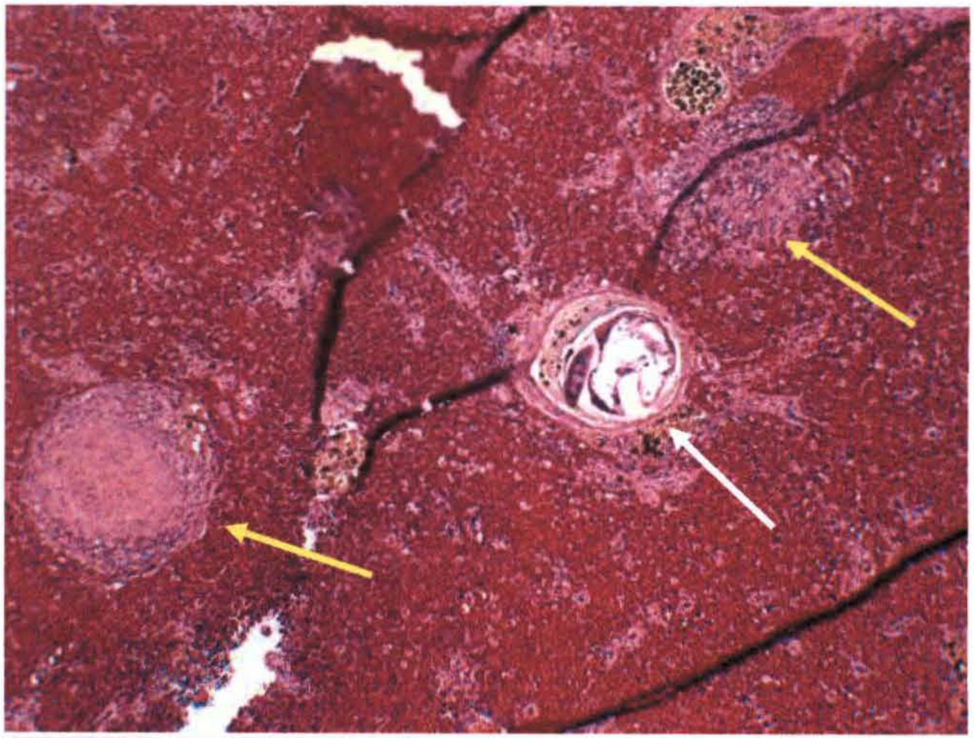
Photographs:



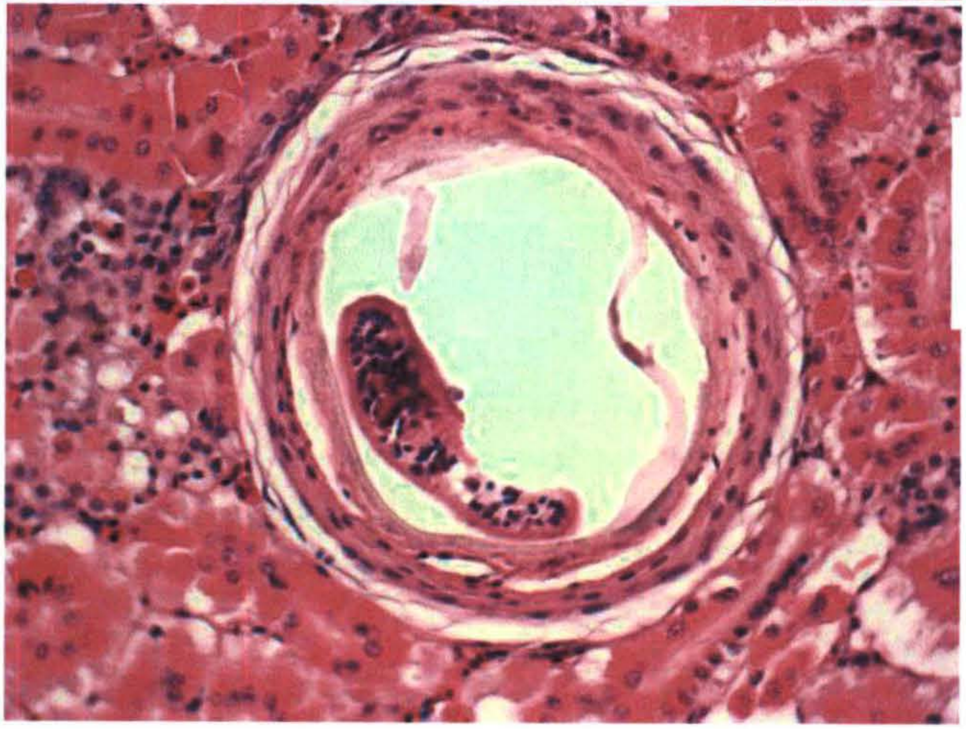
Anterior kidney, H & E, 40x magnification: arrows denote small granulomas.



Anterior kidney, H & E, 1000x magnification: bacteria (small pale blue objects) within center of granuloma.



Spleen, H & E, 100x magnification: yellow arrows point to granulomas, white arrow to metacercariae.



Posterior kidney, H & E, 400x magnification: metacercariae within cyst

MICHIGAN STATE UNIVERSITY

DCPAH
Diagnostic Center for Population & Animal Health

**Director: Dr. Carole Bolin**
**4125 Beaumont Road**
**Lansing, MI 48910-8104**
**Phone: 517-353-1683**
**Fax: 517-353-5096**
**www.animalhealth.msu.edu**

## REPORT OF LABORATORY EXAMINATION

Client:
Finfish and Shellfish Hlth Lab (81184)
University of Florida
7922 NW 71st Street
Gainesville, FL 32653

Owner:
Finfish & Shellfish Health Lab, University of Florida

Rcvd Date: 3/4/2010 11:51:00 AM
Admitted By: Petty, Dr.
Ordered By: N/A
Encounter: 00946024
CR#: GL

Animal: F10017
Species: Aquatic
Age: Unknown
Tag/Reg ID:
Other ID:

MRN:
Breed: Fish, Other
Gender: Unknown

## TOXICOLOGY

## General Toxicology

| Collected Date/Time (If Provided) | 02/11/2010<br>11:51:00 | | |
|---|---|---|---|
| Procedure | | Ref Range | Units |
| GCMS Specimen | other | | |
| GCMS | Negative | | |
| GCMS Interpretation | See Below | | |

02/11/2010 11:51:00 GCMS Interpretation

Please note that the muscle sample tested negative for toxic organic compounds by GC/MS. Wilson K. Rumbeiha BVM, PhD
Clinical Toxicologist
3/19/2010 3:16 PM

L = Low Result; H = High Result; @ = Critical Result; ^ = Corrected Result; * = Interpretive Data; # = Result Footnote

## FLORIDA DEPARTMENT OF AGRICULTURE & CONSUMER SERVICES
## DIVISION OF ANIMAL INDUSTRY
## BUREAU OF DIAGNOSTIC LABORATORIES

**Kissimmee Diagnostic Laboratory**
**PO Box 458006**
**Kissimmee, FL 34745-8006**
**Phone: (321) 697-1499**
**Fax: (321) 697-1467**

**Live Oak Diagnostic Laboratory**
**PO Drawer O**
**Live Oak, FL 32064-0898**
**Phone: (386) 330-5700**
**Fax: (386) 330-5710**

**Veterinarian/Submitter**
Dr. Denise Petty
University of Florida
Fishery and Aquatic Science
7922 NW 71st St
Gainesville, FL 32653

**Fax:** (352)392-3672

**Owner**
UF: F10-017
FL

**Accession:** 10-O02131

**Species:** Aquatic

**Date received** 2/16/2010

**Specimens:** Fresh Tissue

TESTS REQUESTED AND HISTORY ON FILE. COPY AVAILABLE UPON REQUEST.

**REPORT HISTORY-** **PRELIMINARY**
**FINAL** Email 3/5/2010, Mail 3/5/2010

| Test Name | Status |
|---|---|
| Lead (Pb) | Completed |
| Mercury (Hg)(2) | Completed |
| Zinc (Zn) | Completed |
| Copper (Cu) | Completed |
| Electron microscopy(2) | Completed |

---

## ☠Toxicology

**Analysis:** Zinc (Zn)
**Method:** Flame AAS
**Basis:** Wet weight basis

**Date Completed:** 2/26/2010

| Specimen/Animal ID | Specimen | Result |
|---|---|---|
| F10-017 - Gill | Gill | 91.82 ppm |

**Comment:**
No known normal values for this species.

---

**Analysis:** Copper (Cu)
**Method:** Flame AAS
**Basis:** Wet weight basis

**Date Completed:** 2/26/2010

| Specimen/Animal ID | Specimen | Result |
|---|---|---|
| F10-017 - Liver | Liver | 6.38 ppm |

**Comments:**
No known normal values for this species.

**Analysis:** Mercury (Hg) **Date Completed:** 2/26/2010
**Method:** Hydride generation AAS
**Basis:** Wet weight basis

| Specimen/Animal ID | Specimen | Result |
|---|---|---|
| F10-017 - Liver | Liver | 0.039 ppm |
| F10-017 - Muscle | Muscle | 0.011 ppm |

**Comments:**
No known normal values for this species.

---

**Analysis:** Lead (Pb) **Date Completed:** 2/26/2010
**Method:** Graphite Furnace AAS
**Basis:** Wet weight basis

| Specimen/Animal ID | Specimen | Result |
|---|---|---|
| F10-017 - Liver | Liver | 0.77 ppm |

**Comments:**
No known normal values for this species.

## ❁Virology

**Test:** Negative stain electron microscopic examination for viruses.

| Animal ID | Specimen | Result | Date Completed |
|---|---|---|---|
| F10-017 - Kidney | Kidney | Negative | 2/19/2010 |
| F10-017 - Spleen | Spleen | Negative | 2/19/2010 |

**End of Report**
**Veterinary Bulletin:**

Alice Agasan, PhD – Bureau Chief / James Maxwell, DVM – Laboratories Director

MICHIGAN STATE UNIVERSITY

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## REPORT OF LABORATORY EXAMINATION

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Finfish and Shellfish Hlth Lab (81184)
University of Florida
7922 NW 71st Street
Gainesville, FL 32653

Owner:
Finfish & Shellfish Health Lab, University of Florida

Rcvd Date: 3/4/2010 11:52:00 AM
Admitted By: Petty, Dr.
Ordered By: N/A
Encounter: 00946028
CR#: GL

Animal: F10020
Species: Aquatic
Age: Unknown
Tag/Reg ID:
Other ID:

MRN:
Breed: Crab
Gender: Unknown

## Toxicology

## General Toxicology

| Collected Date/Time (If Provided) | 02/17/2010 11:53:00 | | |
|---|---|---|---|
| Procedure | | Ref Range | Units |
| GCMS Specimen | other | | |
| GCMS | Negative | | |
| GCMS Interpretation | See Below | | |

02/17/2010 11:53:00 GCMS Interpretation

Please note that the msucle sample tested negative for toxic organic compounds by the DCPAH GC/MS. Wilson K. Rumbeiha BVM, PhD
Clinical Toxicologist
3/19/2010 3:20 PM

L = Low Result; H = High Result; @ = Critical Result; ^ = Corrected Result; * = Interpretive Data; # = Result Footnote

# Emerging Foodborne Trematodiasis

Jennifer Keiser* and Jürg Utzinger*

Foodborne trematodiasis is an emerging public health problem, particularly in Southeast Asia and the Western Pacific region. We summarize the complex life cycle of foodborne trematodes and discuss its contextual determinants. Currently, 601.0, 293.8, 91.1, and 79.8 million people are at risk for infection with *Clonorchis sinensis*, *Paragonimus* spp., *Fasciola* spp., and *Opisthorchis* spp., respectively. The relationship between diseases caused by trematodes and proximity of human habitation to suitable freshwater bodies is examined. Residents living near freshwater bodies have a 2.15-fold higher risk (95% confidence interval 1.38–3.36) for infections than persons living farther from the water. Exponential growth of aquaculture may be the most important risk factor for the emergence of foodborne trematodiasis. This is supported by reviewing aquaculture development in countries endemic for foodborne trematodiasis over the past 10–50 years. Future and sustainable control of foodborne trematodiasis is discussed.

Foodborne trematodiasis, which is caused by liver flukes (*Clonorchis sinensis*, *Fasciola* spp., *Opisthorchis* spp.), lung flukes (*Paragonimus* spp.), and intestinal flukes (*Echinostoma* spp., *Fasciolopsis buski*, heterophyids), is an emerging public health problem. In China, clonorchiasis infections have more than tripled over the past decade; ≈15 million people were infected with *C. sinensis* in 2004 (1).

The epidemiology of foodborne trematodiasis has changed in recent years. In some settings, the prevalence of foodborne trematode infections decreased significantly, which can be explained by factors such as social and economic development, urbanization, adequate food inspections, health education campaigns, use of chemical fertilizers, and water pollution (2–5). In many other areas, however, higher frequencies and transmission dynamics have been observed, which is probably the result of expansion of aquaculture for production of freshwater fish and crustaceans and improved transportation and distribution systems to bring these aquatic foods to local and international markets (5,6).

The contribution of aquaculture to global fisheries increased from 5.3% in 1970 to 32.2% in 2000 (7). By 2030, at least half of the globally consumed fish will likely come from aquaculture farming (8). Total global registered aquaculture production in 2000 was 45.7 million tons, of which 91.3% was farmed in Asia (7). Freshwater aquaculture production has increased at a particularly high rate; currently, it accounts for 45.1% of the total aquaculture production. For example, the global production of grass carp (*Ctenopharyngodon idellus*), an important species cultured in inland water bodies and a major intermediate host of foodborne trematodes, increased from 10,527 tons in 1950 to >3 million tons in 2002, accounting for 15.6% of global freshwater aquaculture production (http://www.fao.org). The major producer of grass carp is China, where it is traditionally eaten raw as sushi or *yusheng zhou* (1).

As the world's population continues to grow, efforts to increase annual fish production are essential to maintain food with a high protein value. To meet the projected demand, global production of aquatic products needs to double over the next 25 years (9). Because wild stocks are being increasingly overfished, ≈50% of marine fisheries are being used at maximum capacity, the aquaculture sector must expand to meet future needs (8,9). Aquaculture production is expected to grow at an annual rate of 5% to 7% at least until 2015 (10). Aquaculture development will provide employment and spur economic growth, both important factors for reducing poverty. However, this expansion and intensification of aquaculture should be monitored carefully in countries where foodborne trematodes are endemic because their frequencies might increase, leading to more subclinical and clinical disease.

To our knowledge, no comprehensive analysis of the relationship between occurrence of foodborne trematodiasis and development of water resources has been conducted. This situation motivated us to update estimates of people at risk for the major foodborne trematodes, to quantify the changes in freshwater fish and crustacean production in the past 10–50 years in trematodiasis-endemic countries, and to examine the relationship between

---

*Swiss Tropical Institute, Basel, Switzerland

proximity of human habitation to freshwater bodies and infections with liver, lung, or intestinal flukes. Our work will contribute to strengthening and expanding the current evidence base of contextual determinants of water-related, vectorborne diseases, including malaria (*11*), lymphatic filariasis (12), and Japanese encephalitis (13).

## Life Cycle

The complex life cycle of foodborne trematodes has been summarized in recent publications (1,5). Briefly, parasite eggs from infected humans or animals reach freshwater bodies through contaminated fecal matter, e.g., through nonhygienic defecating habits of humans or the use of human feces for fertilizer (night soil) (4). Foodborne trematodes have widespread zoonotic reservoirs. Cats, dogs, foxes, pigs, and rodents are definitive hosts for *C. sinensis*, and domestic ruminants serve as reservoirs for *Fasciola hepatica* infections (1,14). Once eggs have reached a suitable body of fresh water, they develop and release a miracidium. It enters an aquatic snail, which acts as first intermediate host. Inside the snail, within several weeks, the miracidium transforms into cercariae. They are released into the freshwater environment and attach, penetrate, and encyst as metacercariae in susceptible second intermediate hosts. Infection with foodborne trematodes is accomplished through ingestion of metacercariae by eating raw or insufficiently cooked freshwater fish (*C. sinensis*, *Opisthorchis* spp., *Echinostoma* spp., heterophyids, *Metagonimus* spp.), freshwater crab or crayfish (*Paragonimus* spp.), aquatic plants (*Fasciola* spp., *Fasciolopis buski*), snails or tadpoles (*Echinostoma* spp.), or by drinking contaminated water (*Fasciola* spp.).

## Contextual Determinants

Figure 1 depicts the contextual determinants of foodborne trematodiasis. The most important epidemiologic features responsible for transmission of foodborne trematodes include 1) ecologic and environmental factors, 2) behavioral factors, and 3) socioeconomic and cultural factors.

Population dynamics of the first intermediate host snails are affected by several environmental factors, particularly the quality, current, and temperature of the fresh water. For example, *Fossaria cubensis* and *Pseudosuccinea columella,* first intermediate hosts of *F. hepatica*, were studied in Cuba. While the former snail was more abundant in polluted habitats, the latter snail prefers clean water (15). Rainfall or evapotranspiration also show a correlation with intermediate host snail populations. In many countries, a seasonal distribution of facioliasis affected by temperature and rainfall has been observed (16).

More than 100 fish species are secondary intermediate hosts for *C. sinensis* and 35 are secondary intermediate hosts for *Opisthorchis* spp. (17). More than 50 species of crustacean have been identified as secondary intermediate hosts for *Paragonimus* spp. (17). With the exception of the second intermediate host of the heterophyids (mullets, perches, and gobies), which thrive in brackish water (4), the second intermediate hosts of the other foodborne trematodes are confined to stagnant or slow-flowing fresh water (Table 1). Irrigation schemes, particularly those for rice growing, are also highly suitable reservoirs for the intermediate hosts.

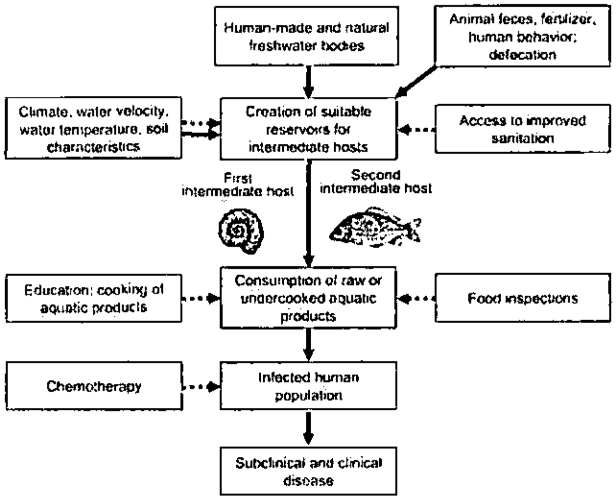

Figure 1. Contextual determinants of foodborne trematodiasis. Solid arrows, negative impact; dashed arrows, positive impact.

Behavioral determinants include unsanitary defecation habits, use of human excreta as fertilizer, and food consumption and cooking habits. In villages near the Nam Pong water resources development project in Thailand, no correlation was found between households with latrines and the extent of opisthorchiasis (21). Cooking and food consumption–related determinants are complex and include economic and sociocultural (i.e., beliefs and tradition) factors. Traditional local dishes include raw or partially cooked aquatic products. They are frequently eaten in areas endemic for foodborne trematodiasis and are part of deeply rooted cultures. Examples of typical local fish dishes include raw crab soaked in soy sauce (*ke-jang*) in the Republic of Korea, raw drunken crabs and raw grass carp in China, and raw fish (*lab-pla* and *plasom*) in Thailand (1,17). Conversely, in industrialized countries (e.g., Japan), infections are often coupled with foreign travel and eating imported aquatic foods or exotic delicacies (22).

Public health interventions, such as chemotherapy, access to improved sanitation, food inspections, and education campaigns to teach proper cooking methods for fish and other potentially contaminated aquatic foods, will affect the pool of parasites. They will also reduce the prevalence of major foodborne trematode infections.

Table 1. Geographic distribution and population at risk for major foodborne trematode infections

| Foodborne trematodes | Species | Geographic distribution | Second intermediate hosts; habitats | Population at risk (× $10^6$) |
|---|---|---|---|---|
| Liver flukes | *Clonorchis sinensis* | China (except for Inner Mongolia, Ningxia, Qinghai, Tibet, Xinjiang), Republic of Korea, Taiwan, Vietnam* | >100 species of freshwater fish; freshwater habitats with stagnant or slow-moving waters (ponds, river, aquaculture, swamps, rice fields) | 601.0† |
| | *Opisthorchis felineus* | Kazakhstan, Russian Federation, Siberia, Ukraine‡ | >35 species of freshwater fish; freshwater habitats with stagnant or slow-moving waters (ponds, river, aquaculture, swamps, rice fields) | 12.5§ |
| | *Opisthorchis viverrini* | Cambodia, Lao People's Democratic Republic, Thailand, Vietnam‡ | | 67.3¶ |
| | *Fasciola hepatica*, *Fasciola gigantica* | Altiplano of Bolivia, Cuba, highlands of Ecuador and Peru, Nile delta of Egypt, northern Islamic Republic of Iran, Portugal, Spain‡ | Watercress and other water plants (drinking water); irrigation channels, pastures, banks of rivers, ponds, pools | 91.1# |
| Lung flukes | *Paragonimus* spp. | Southwestern Cameroon, China, Ecuador, eastern Nigeria, Peru, the Philippines, Republic of Korea** | >50 species of freshwater crab and crayfish; freshwater habitats with stagnant or slow-moving water (ponds, aquaculture) | 292.8†† |
| Intestinal flukes | *Fasciolopsis buski* | Bangladesh, China, India, Indonesia, Malaysia, Taiwan, Thailand‡‡ | Water caltrop, water chestnut, water hyacinth, water bamboo, duckweed, water mimosa, water spinach; drainage systems of pig farms, freshwater habitats with stagnant or slow-moving waters | Not known |
| | *Echinostoma* spp. | China, Indonesia, Malaysia, the Philippines, Republic of Korea, Taiwan, Thailand‡‡ | Molluscs, fish, snails and tadpoles; freshwater or brackish habitats with stagnant or slow-moving waters | Not known |
| | *Heterophyes heterophyes* | China, Egypt (Nile delta), India, Indonesia, Islamic Republic of Iran, Philippines, Sudan, Taiwan, Tunisia, Turkey‡‡ | Brackish water fish (mullets, perches, gobies); brackish water habitats | Not known |
| | *Metagonimus yokogawai* | The Balkans, China, Indonesia, Islamic Republic of Iran, Israel, Japan, Republic of Korea, Spain, Taiwan‡‡ | Freshwater (Cyprinid) fish; freshwater habitats | Not known |

*References 1 and 18.

†Obtained by adding population at risk in China (*including Taiwan*) (1), Vietnam (10 million; J.Y. Chai, pers. comm.), and Republic of Korea (44% of 2005 population (17,19).

‡Reference 17.

§Obtained by adding 8% of 2005 population in Russian Federation, 1.3% in Kazakhstan, and 2% in Ukraine (17,19).

¶Obtained by adding 2005 population in the Lao People's Democratic Republic, population at risk in Vietnam (10 million; J.Y. Chai, pers. comm.), and 80% of 2005 population in Thailand (17,19).

#Obtained by adding 23% of 2005 population in Bolivia, 20.6% in Ecuador, 35.3% in Peru, 24.3% in Spain, 44.2% in Portugal, 50.7% in Egypt, 10.8% in the Islamic Republic of Iran, and total 2005 population in Cuba (17,19).

**References 4, 17, and 18.

††Obtained by adding 15.9% of 2005 population in China, 18.9% in Ecuador, 1.4% in Peru, and 14% in Republic of Korea (17,19). Population at risk in Cameroon estimated at 2.7 million (population of the South and Central province, known foci for paragonimiasis [20], estimated at 1.5 million in 1982 [http://www.absoluteastronomy.com/encyclopedia/C/Ce/Centre_Province_Cameroon.htm]), which we standardized to 2005 (19). No estimate was provided for population at risk in eastern Nigeria.

‡‡Reference 4.

## Geographic Distribution and Population at Risk

Table 1 summarizes the disease endemic countries and estimated populations at risk for the major foodborne trematodes. For China and Vietnam, we used recent estimates of their at-risk population (1) (J.Y. Chai, pers. comm.). For other countries, estimates of at-risk populations have been obtained by multiplying the fraction of a previous estimate of the population at risk provided by an expert committee of the World Health Organization (17) by the most recent population figures available (19). For example, in 1995, an estimated 19 million people (44%) in the Republic of Korea were at risk for clonorchiasis. Applying the latest United Nations national population statistics (19), we estimate that 21 million people are now at risk for infection with *C. sinensis* in the Republic of Korea.

We found that 601 million people are currently at risk for infection with *C. sinensis*, of whom 570 million are in China and Taiwan. *C. sinensis* is also prevalent in Vietnam. *Opisthorchis viverrini* is endemic in Cambodia, the Lao People's Democratic Republic, Thailand, and Vietnam, and *O. felineus* is endemic in the former Soviet Union, Kazkastan, and Ukraine (17,18). An estimated 67.3 million people are at risk for infection with *O. viverrini* and 12.5 million are at risk for infection with *O. felineus*.

Human fascioliasis is a major public health problem in the Andean countries, western Europe, the Islamic

Republic of Iran, Egypt, and Cuba (16), with an estimated 91 million people at risk. This figure is half the previous estimate (17) because China has not been included in our calculation. Although *F. hepatica* is of considerable veterinary significance in China, human infections are rare (23). This finding supports our position not to include this country in the estimate. At least 292.8 million people are at risk for infection with *Paragonimus* spp., with 195 million residing in China. Paragonimiasis also occurs in the Republic of Korea and the Philippines, parts of Africa (eastern Nigeria and southwestern Cameroon), and South America (Ecuador and Peru) (17,18).

No estimates are currently available regarding populations at risk for intestinal flukes. *F. buski* is common in Bangladesh, China, India, Indonesia, Malaysia, Taiwan, and Thailand (17,18). Echinostomes have been reported in China, Indonesia, Malaysia, the Philippines, the Republic of Korea, Taiwan, and Thailand (18). Among the heterophyids, *Heterophyes heterophyes* and *Metagonimus yokogawai* are the 2 species of greatest medical importance. They are prevalent in the Balkans, China, Egypt, India, Indonesia, the Islamic Republic of Iran, Israel, Japan, the Republic of Korea, the Philippines, Spain, Sudan, Taiwan, Thailand, Tunisia, and Turkey (4).

## Aquaculture Development in Trematode-endemic Countries

Aquaculture is the most rapidly growing food sector and global consumption of aquatic products has exceeded that of meat products (24). Numerous aquatic products are available at affordable prices to most population segments in the developing world. For ≈1 billion people, these foods provide more than one fourth of their total animal protein supply (24). We compiled data on the development of freshwater fish and crustacean production in the past 10–50 years with an emphasis on those countries where *C. sinensis*, *O. felineus*, *O. viverrini*, and *Paragonimus* spp. are endemic. Data were obtained from the Food and Agricultural Organization (http://www.fao.org/fi/default.asp).

Freshwater fish aquaculture has increased exponentially from an annual production of 136,000 tons in 1952 to 16.6 million tons (Figure 2) 50 years later in China, the Republic of Korea, and Vietnam. Most (97.6%, 16.2 million tons) of this fish is produced in China. In China, the amount of land used for aquaculture has increased by 75% from 2.8 million hectares in 1970 to 4.9 million hectares in 1997 (7). Freshwater crustacean production in China has increased 48-fold over the past decade from 9,509 tons in 1992 to 453,696 tons in 2002. These developments are of considerable health concern because fish and crustaceans act as second intermediate hosts of clonorchiasis and paragonimiasis, respectively.

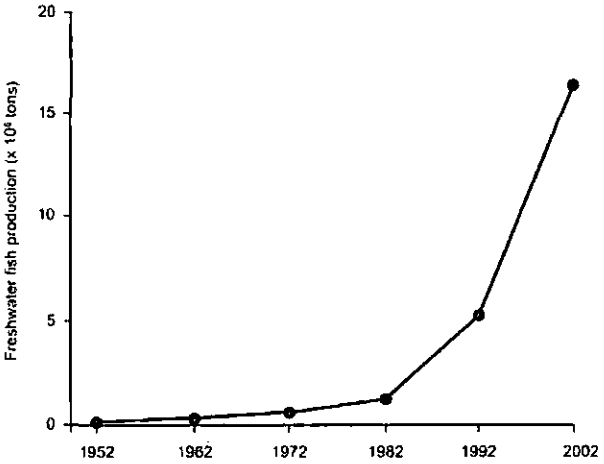

Figure 2. Development of freshwater fish production in China, 1952–2002.

Figure 3 shows that a large increase in aquaculture has also occurred in the *O. viverrini*–endemic countries of Cambodia, the Lao People's Democratic Republic, Thailand, and Vietnam. In Vietnam, freshwater fish production increased from 41,750 tons in 1962 to 390,000 tons 40 years later (a 9.3-fold increase). Conversely, fish production has decreased by 29.4% in the *O. felineus*–endemic countries of Kazakhstan, Ukraine, and the Russian Federation from 171,542 tons in 1992 to 121,032 tons in 2002.

Available aquaculture statistics are underestimated because small-scale aquaculture or rice field fisheries are not included in officially reported annual production. For example, although the officially reported annual number of inland fish produced in the Lao People's Democratic Republic in 1999 was 25,521 tons, the estimated total figure was 5.9- and 7.8-fold higher (150,000–200,000 tons) (25).

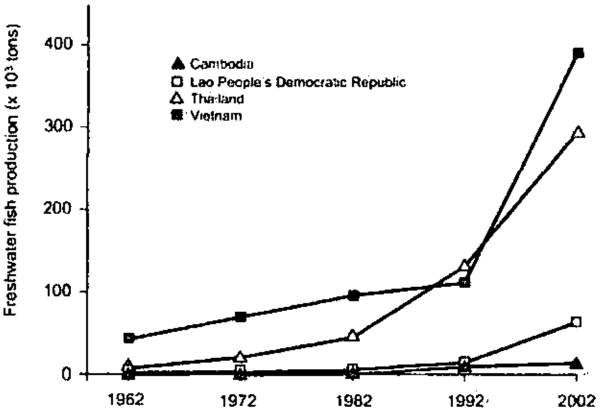

Figure 3. Development of freshwater fish production in *Opisthorchis viverrini*–endemic countries, 1962–2002.

Freshwater aquaculture is often largely dispersed, characterized by an informal nature, and usually operated in remote rural areas. Part-time fishing is the rule rather than the exception and, most importantly, the dominant share of the production is eaten within the communities where freshwater fish and other aquatic products are cultivated (25).

## Relationship between Foodborne Trematodiasis and Proximity to Freshwater Bodies

We systematically reviewed the literature with an emphasis on proximity of human habitation to any form of freshwater body and its relationship to foodborne trematodiasis. Our search included the National Library of Medicine's Medline, Scielo, Biosis previews, and the Web of Science. We used the following keywords: *Opisthorchis*, *Clonorchis*, *Fasciola*, *Echinostoma*, *Fasciolopsis*, foodborne trematodes, and foodborne trematodiasis in combination with prevalence, water, river, irrigation, dam, aquaculture, pond, and stream. Papers published in English, French, and German were considered. We also included manuscripts in Chinese, Japanese, Korean, and Russian if there was an English abstract of these papers on the aforementioned electronic databases.

Information from 12 studies on the prevalence of foodborne trematode infections in villages located close to freshwater bodies (i.e., rivers, streams, dam reservoirs, and irrigation schemes) and more distant villages is shown in Table 2. Five studies were conducted in the Republic of Korea, 4 in Thailand, 2 in Peru, and 1 in Vietnam. Five studies analyzed *C. sinensis*, 4 analyzed *O. viverrini*, and 2 analyzed *F. hepatica*. *M. yokogawai* was examined in 2 settings.

Relative risk (RR) calculations were attainable for 10 studies. We calculated RR and 95% confidence intervals (CIs) by using EasyMA software (36). A random-effects model was used for calculation of pooled RR because the interventions and conditions in these studies were expected to be heterogeneous (37). The results are summarized in Table 2 and shown as Forrest plots in Figure 4. The random summary RR measure was 2.15 (95% CI 1.38–3.36) indicating that risk for infection with foodborne trematodes in villages near freshwater bodies is 2.15-fold higher compared to that farther from the water. In 2 villages on the Khong River and Nam Pong water resources development project in northeastern Thailand, lower prevalences of *O. viverrini* were observed near the river and reservoir compared with villages not using these water sources. These observations can be explained by low snail densities in the dam reservoir (10) and the Khong River, the latter because of faster current (33).

## Discussion and Conclusions

In an attempt to update the current picture of foodborne trematodiasis, we estimate that 601.0, 293.8, 91.1, and 79.8 million people are at risk for infection with *C. sinensis*, *Paragonimus* spp., *Fasciola* spp., and *Opisthorchis* spp., respectively. In the absence of recent national figures for at-risk populations, number of persons infected, and spatiotemporal distribution of these diseases in most trematodiasis-endemic countries, our estimates should be used judiciously.

Several issues are worth highlighting. First, estimates of persons at risk for major foodborne trematodes are considerably higher than most recent (dating back 10 years) comprehensive estimates. For example, the at-risk population for infection with *C. sinensis* was estimated to be 289 million people in the mid 1990s (17), which is less than half of the current estimate. Second, of great concern is the high number (15 million) of *C. sinensis* infections recently reported from China (1). Thus, within 10 years the number of *C. sinensis* infections has more than tripled in this country, which warrants in-depth investigations on the underlying causes. Third, it is important to juxtapose these observations with trends observed over the same period, but with an emphasis on soil-transmitted helminthiasis and schistosomiasis. In many parts of Southeast Asia, including China, the number of people infected with *Schistosoma japonicum* and the major soil-transmitted helminths (i.e., *Ascaris lumbricoides*, hookworms, and *Trichuris trichiura*) has decreased (38,39). These decreases are the result of socioeconomic development and chemotherapy-based illness control programs that largely depend on treatment with praziquantel, albendazole, and mebendazole. The issue of why there was an increase in the number of persons infected with *C. sinensis* when decreases were observed for *S. japonicum* and soil-transmitted helminthes therefore arises. We speculate that aquaculture development is the key risk factor.

Aquaculture is a rapidly growing food sector, mainly in the developing world, and particularly in Asian countries. Development of this sector is of pivotal importance for adequate supplies of food, generation of income, and employment. Different farmed aquatic products are affordable parts of the diet and essential contributors to human health in the developing world (24). However, aquaculture development results in ecologic transformations (40), and numerous aquatic animal diseases have emerged. Overcrowding and poor environmental conditions have been observed on fish farms, which lead to reduced immunity and higher susceptibility to common diseases (41). For example, massive infection with heterophyid metacercariae of aquacultured eels has been documented in Taiwan; dissection showed ≤3,762 heterophyid metacercariae in a single fish (42). In Tasmania, a higher number

Table 2. Studies comparing the prevalence of foodborne trematode infections in villages close to water bodies with distant villages*

| Study site, period (reference) | Population sample | Characteristics of water body | Prevalence | RR (95% CI) |
|---|---|---|---|---|
| Asillo irrigation area, Peru, 1999 (26) | 338 school children | 500-hectare irrigation area with irrigation canals and drainage channels | *Fasciola hepatica*: 18.8%, 20.3%, 31.3% in 3 schools in irrigation scheme | NA |
| Kimhae county, Republic of Korea, 1974 (27) | 1,809 | River region | *Clonorchis sinensis*: 72.1% near riverside and 41.3% inland | 1.74 (1.57–1.92) |
| Goyang county, Republic of Korea, 1974 (27) | 578 | River region | *C. sinensis*: 32.7% near riverside and 6.3% inland | 5.16 (3.04–8.75) |
| Hadong Gun, Republic of Korea, 1978 (28) | 1,163 | Rivers and streams | *Metagonimus yokogawai*: 5.4%–90.8% in villages close to river and streams and 4% in village 4 km from river | 7.44 (2.83–19.54) |
| Pohang industrial belt, Republic of Korea, 1989 (29) | 3,180 employees; 200 for questionnaire analysis | Hyungsai River basin | *C. sinensis*: 52% of infected employees lived near river compared with 27.9% of uninfected employees | 1.85 (1.28–2.67) |
| Okcheon-gun, Republic of Korea, 2000 (30) | 1,081 | Geum-Gang River | *C. sinensis*: 14.2% of inhabitants near river were infected compared with 3.2% of inland residents | 4.51 (2.64–7.70) |
| | | | *Metagonimus* spp.: 8.4% of inhabitants near river were infected, compared with 1.7% of inland residents | 5.01 (2.40–10.46) |
| Nong Wai irrigation area, Khon Kaen, Thailand, 1974–1975 (31) | *627 children* | Irrigation canal and channels | *Opisthorchis viverrini:* 7.3% in irrigated villages and 3.3% in nonirrigated villages | 2.20 (0.87–5.51) |
| Nam Pong development project, Khon Kaen province, Thailand, 1977–1978 (21) | 3,183 | Reservoir and irrigation scheme | *O. viverrini:* 27.1% in irrigated villages and 17.2% in traditional villages (no irrigation) | 1.63 (1.34–2.00) |
| | | | *O. viverrini:* 10.8% lakeside and 11.5% in resettlement areas | 0.93 (0.66–1.31) |
| Chonnabot village, Khon Kaen province, Thailand, 1980–1982 (32) | 4,638; 246 for incidence calculation | Wide, shallow reservoirs that remained dry in 1981–1982 | *O. viverrini:* 47% in uninfected individuals becoming positive within 1 year while reservoirs were flooded and 20% during period when reservoirs were dry† | 2.17 (1.42–3.29) |
| 18 villages in Nong Khai and Loei provinces, Thailand, 1981–1982 (33) | 1,259 | Khong River and Huang River (flowing water) | *O. viverrini:* 51.7% and 52.6% in villages >5 km from river and 27.9% and 21.7% in villages closer to river | 0.47 (0.40–0.56) |
| 12 provinces of Vietnam, 1994–2000 (34) | >20,000 | Red River delta region | *C. sinensis*: ≤31% in coastal delta region, 5% in mountainous area, and 16.3% in highlands. *O. viverrini*: highest in urban coastal areas | NA |
| Mantaro valley, Peru, 2000 (35) | 206 children | Small streams | | Odds ratio 17.22 |
| All studies | | | | 2.15 (1.38–3.36) |

*RR, relative risk; CI confidence interval; NA, not available.
†Incidence values.

of trichodinids and cilian protozoan parasites were found in fish raised on farms compared to fish caught in natural bodies of water (43).

In reviewing the literature, we found that residents living near bodies of fresh water have, on average, a 2.15-fold higher risk for infections with foodborne trematodes compared to inhabitants of distant villages. Unfortunately, all studies that could be included in our metaanalysis were conducted either in the Republic of Korea or Thailand, and several of these studies date back to the 1970s. Our finding is consistent with previous observations that most of the locally caught aquatic foods are eaten in the communities near freshwater bodies (17,25). However, with improving transportation and distribution systems, which allow efficient transportation of fish, the amount sold outside the local community is likely to increase considerably. Thus,

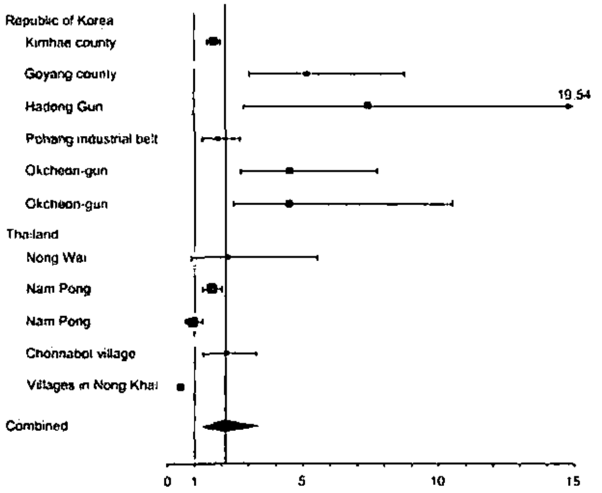

Figure 4. Metaanalysis of studies comparing the prevalence of foodborne trematode infections in villages close to water bodies with distant villages. Values on the x-axis are relative risks. Horizontal bars show 95% confidence intervals. The solid vertical line represents the mean of the combined measure. The diamond represents the combined measure.

the spatial distribution of foodborne trematodiasis will change, with an increasing prevalence of these infections in villages where no aquatic products are farmed. We suggest that future studies examine the present spatial distribution of foodborne trematodiasis in Asian countries, compare prevalence of infection in aquaculture workers with other professional groups, and determine the prevalence of parasites in fish raised in aquaculture ponds compared with natural water bodies.

This review emphasizes the important role aquaculture plays in transmitting foodborne trematodiasis. In view of the rapid growth of this food sector, strategies to reduce the current impact of these diseases and to reverse their emergence are mandatory. Safe, efficacious, and inexpensive single-dose oral drugs, such as praziquantel and triclabendazole, are available to treat foodborne trematodiasis and will remain the backbone of control (5). To enhance sustainability, chemotherapy should be used with new technologies to ensure food safety, sound health education campaigns for properly cooking aquatic foods, and access to improved sanitation.

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Dr Utzinger is project leader at the Department of Public Health and Epidemiology, Swiss Tropical Institute. His research interests include the epidemiology and control of foodborne trematodiasis, malaria, schistosomiasis, and soil-transmitted helminthiasis.

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# TOXICITY IN *TILAPIA ZILLI* AND *CLARIAS LAZERA* (PISCES) INDUCED BY ZINC, SEASONALLY

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**Abstract**—1. Subadult teleosts, *Tilapia zilli* and *Clarias lazera*, were exposed in laboratory bioassays to lethal and sublethal concentrations of zinc, seasonally (at range of temperature between 9.3 ± 1.5 and 25 ± 1°C).

2. It appears that *Tilapia* is more susceptible to Zn than *Clarias* and both species are more resistant to Zn toxicity at lower temperature (during winter).

3. To determine the uptake and tissue distribution of Zn in the two species, gill, liver and muscles were analysed at moderate temperature (during spring). After a 96 hr exposure period, Zn was decreased in the following order: gill > liver > muscle.

## INTRODUCTION

There is no doubt that Zn is biologically essential. It is ubiquitous in plants, microorganisms and animals. Its defficiency results in loss of appetite, inability to gain weight, skeletal abnormalities, parakeratotic oesophageal and skin lesions. However, ingestion of excess Zn results in fever, nausea, vomiting, and pathological changes in some tissues (Burch *et al.*, 1975; Ueda *et al.*, 1984; Somasundaram *et al.*, 1984).

Several years ago, investigations were made to study the toxic effects of heavy metals on aquatic organisms (Doudoroff and Katz, 1953; Skidmor, 1964; Sprague and Ramsay, 1965). Many factors have been shown to affect the relative toxicity of these metals to the aquatic animals, particularly fish (Mallatt, 1985). Temperature is one important factor that could affect metal toxicity, since most aquatic organisms are poikilothermic.

The present account deals with comparative studies on the relative resistance of two teleost species to Zn. Evaluation of the toxicological effects was based on the observations of mortality rates and behavioural changes. Its bioaccumulation in gills, liver and muscles was also determined.

## MATERIALS AND METHODS

Subadult *Tilapia zilli* and *Clarias lazera* (fish) were collected from ponds at the Nozha hydrodrom in Alexandria, Egypt. The average physicochemical characteristics of the water were: hardness ($CaCo_3$), 20–22 mg/l; dissolved oxygen, 90%; pH, 6.7. Animals were maintained in a photoperiod of 12 hr dark and 12 hr light. Two static bioassay tests were carried out in each season. The first was made using *Tilapia zilli*, while the second was carried out using *Clarias lazera*. In general, the methodology for the bioassays was similar to that of Hilmy *et al.* (1985). The stock solution of zinc was made by dissolving reagent grade $ZnSO_4 \cdot 5H_2O$ in distilled water at 30 mg $Zn^{2+}$/ml. Aliquots of this stock were added to the bioassay containers about 60 min after the assay organisms to achieve the desired $Zn^{2+}$ concentrations.

Both behaviour and deaths of the test organisms were recorded during the 96 hr exposure period. Seasonal changes in $LC_{100}$, $LC_{75}$, $LC_{25}$ and $LC_0$, for each species after 24, 48, 72 and 96 hr, were determined according to the method of the American Public Health Associations (1971).

At a moderate temperature (during spring) and after the determination of the 96 hr $LC_{50}$ for each species, the gills (gill rackers, arches and filaments), livers and muscles were excised and prepared for $Zn^{2+}$ analyses. Zn determination was carried out as previously published by Hilmy *et al.* (1986) except that the tissues were dried at 105°C for 48 hr before digestion.

## RESULTS

### *Survival patterns*

On the basis of 24, 48, 72 and 96 hr exposure periods, $LC_{100}$, $LC_{75}$, $LC_{50}$, $LC_{25}$ and $LC_0$ were estimated for *Tilapia zilli* and *Clarias lazera*, seasonally (Tables 1–8). Accordingly, these tables clearly show that the first species is more sensitive to Zn toxicity than the latter. Seasonal variations of the lethality of Zn vary

Table 1. Concentrations of $Zn^{2+}$ (mg/l) added to medium at start, and the resulting survival of various percentages of *Tilapia zilli* at 15.3 ± 2.1°C (in autumn)

| | Time (hr) | | | |
|---|---|---|---|---|
| | 24 | 48 | 72 | 96 |
| $LC_{100}$ | 52 | 47 | 43 | 40 |
| $LC_{75}$ | 43 | 41 | 38 | 34 |
| $LC_{50}$ | 38 | 34 | 32 | 27 |
| $LC_{25}$ | 29 | 25 | 22 | 18 |
| $LC_0$ | 24 | 20 | 14 | 12 |

Table 2. Concentrations of $Zn^{2+}$ (mg/l) added to medium at start, and the resulting survival of various percentages of *Tilapia zilli* at 9.3 ± 1.5°C (in winter)

| | Time (hr) | | | |
|---|---|---|---|---|
| | 24 | 48 | 72 | 96 |
| $LC_{100}$ | 60 | 57 | 50 | 47 |
| $LC_{75}$ | 55 | 52 | 45 | 40 |
| $LC_{50}$ | 49 | 45 | 40 | 33 |
| $LC_{25}$ | 50 | 47 | 38 | 25 |
| $LC_0$ | 40 | 37 | 30 | 18 |

Table 3. Concentrations of $Zn^{2+}$ (mg/l) added to medium at start, and the resulting survival of various percentages of *Tilapia zilli* at 18.5 ± 1°C (in spring)

| | Time (hr) | | | |
|---|---|---|---|---|
| | 24 | 48 | 72 | 96 |
| LC$_{100}$ | 37 | 36 | 33 | 30 |
| LC$_{75}$ | 35 | 33 | 29 | 26 |
| LC$_{50}$ | 33 | 29 | 24 | 21 |
| LC$_{25}$ | 22 | 17 | 14 | 11 |
| LC$_{0}$ | 21 | 16 | 12 | 10 |

Table 4. Concentrations of $Zn^{2+}$ (mg/l) added to medium at start, and the resulting survival of various percentages of *Tilapia zilli* at 25 ± 1.4°C (in summer)

| | Time (hr) | | | |
|---|---|---|---|---|
| | 24 | 48 | 72 | 96 |
| LC$_{100}$ | 32 | 29 | 28 | 26 |
| LC$_{75}$ | 27 | 24 | 23 | 19 |
| LC$_{50}$ | 22 | 18 | 16 | 13 |
| LC$_{25}$ | 17 | 13 | 9 | 7 |
| LC$_{0}$ | 12 | 8 | 5 | 2 |

Table 5. Concentrations of $Zn^{2+}$ (mg/l) added to medium at start, and the resulting survival of various percentages of *Clarias lazera* at 15.3 ± 2.1°C (in autumn)

| | Time (hr) | | | |
|---|---|---|---|---|
| | 24 | 48 | 72 | 96 |
| LC$_{100}$ | 90 | 79 | 72 | 70 |
| LC$_{75}$ | 72 | 65 | 59 | 56 |
| LC$_{50}$ | 58 | 52 | 46 | 40 |
| LC$_{25}$ | 45 | 39 | 33 | 22 |
| LC$_{0}$ | 31 | 29 | 19 | 16 |

Table 6. Concentrations of $Zn^{2+}$ (mg/l) added to medium at start, and the resulting survival of various percentages of *Clarias lazera* at 9.3 ± 1.5°C (in winter)

| | Time (hr) | | | |
|---|---|---|---|---|
| | 24 | 48 | 72 | 96 |
| LC$_{100}$ | 92 | 88 | 85 | 75 |
| LC$_{75}$ | 79 | 77 | 72 | 65 |
| LC$_{50}$ | 68 | 60 | 58 | 52 |
| LC$_{25}$ | 59 | 52 | 47 | 42 |
| LC$_{0}$ | 45 | 42 | 37 | 32 |

Table 7. Concentrations of $Zn^{2+}$ (mg/l) added to medium at start, and the resulting survival of various percentages of *Clarias lazera* at 18.5 ± 1°C (in spring)

| | Time (hr) | | | |
|---|---|---|---|---|
| | 24 | 48 | 72 | 96 |
| LC$_{100}$ | 80 | 76 | 71 | 64 |
| LC$_{75}$ | 67 | 63 | 56 | 47 |
| LC$_{50}$ | 56 | 52 | 43 | 38 |
| LC$_{25}$ | 42 | 40 | 28 | 26 |
| LC$_{0}$ | 32 | 20 | 18 | 15 |

Table 8. Concentrations of $Zn^{2+}$ (mg/l) added to medium at start, and the resulting survival of various percentages of *Clarias lazera* at 25 ± 1°C (in summer)

| | Time (hr) | | | |
|---|---|---|---|---|
| | 24 | 48 | 72 | 96 |
| LC$_{100}$ | 56 | 53 | 51 | 39 |
| LC$_{75}$ | 48 | 45 | 42 | 32 |
| LC$_{50}$ | 41 | 37 | 33 | 26 |
| LC$_{25}$ | 32 | 28 | 26 | 19 |
| LC$_{0}$ | 26 | 20 | 17 | 14 |

dramatically depending on changes in water temperature of each season. Teleasts were more susceptible to Zn at 25 ± 1 than at 9.3 ± 1.5°C, by factors that ranged between 2.9–3.5 and 1.6–1.7 in the first and second species, respectively.

### *Behaviour changes*

The behavioural patterns were the same for both species. At high concentrations there was agitation, air gulping, accelerated ventilation with rapid mouth and opercular movements which became arrhythmic and convulsion. At low concentrations the symptoms were less acute. The fish showed signs of tiredness and lost positive rheotaxis after a period of weakness and apathy.

### *Accumulation*

Teleosts were exposed for 96 hr to 21 or 38 mg $Zn^{2+}$/l for the first or the second species, respectively (which represents the 96 hr LC$_{50}$ at the spring season). Among survivors, the highest Zn residues were found in gills followed by liver. The muscles accumulated the smallest amount (Table 9).

## DISCUSSION

### *Survival patterns*

The response of *Tilapia zilli* and *Clarias lazera* to Zn toxicity was quite different. It appears that the first species is more sensitive than the latter. The acute lethality values, in the present study, indicate that these two teleost species are more resistant to Zn toxicity than other aquatic animals. For example, Cairns and Scheier (1958) found that the 96 hr LC$_{50}$ for snails ranged from 0.79 to 1.27 mg $Zn^{2+}$/l, while Thorp and Lake (1974) mentioned that the 96 hr LC$_{50}$ for the fresh water fish, *Paratya tasamaniensis*, was 1.1 mg Zn/l. On the other hand, the LC$_{50}$ for Zn to juvenile flag fish, *Jourdanella floridae*, was 1.5 mg/l (Spehar, 1976).

Our results indicate that water temperature altered the lethality of Zn to the two species. Therefore, Zn

Table 9. Concentrations of $Zn^{2+}$ in gill, liver and muscle of teleosts after 96 hr exposure to the LC$_{50}$ of $Zn^{2+}$*

| | | Tissue | | | | | |
|---|---|---|---|---|---|---|---|
| | | Gill | | Liver | | Muscle | |
| Species | Treatment | Mean | Range | Mean | Range | Mean | Range |
| *Tilapia zilli* | Control | 0.070 ± 0.003 | 0.030–0.100 | 0.050 ± 00.001 | 00.010–00.090 | 0.010 ± 00.002 | 0.007–00.030 |
| | Treated | 38.000 ± 7.800 | 34.00–43.000 | 23.000 ± 3.700 | 18.000–26.000 | 2.000 ± 00.700 | 1.500–03.700 |
| *Clarias lazera* | Control | 00.090 ± 00.060 | 00.050–00.150 | 00.080 ± 00.005 | 00.060–00.120 | 0.020 ± 00.003 | 0.009–0.030 |
| | Treated | 49.000 ± 5.800 | 46.000–52.000 | 34.000 ± 4.500 | 29.000–39.000 | 5.000 ± 00.900 | 3.000–6.500 |

*Each value represents the mean of three experiments ± the SD, expressed in mg $Zn^{2+}$/g tissue dry weight.

toxicity appears to be enhanced by temperature as a stressor. It may have produced this effect through transient change in metabolic rates. Fish accumulate Zn from the water primarily through the gills (Eisler, 1967). Its uptake could be controlled by the amount of water passing through the gills. Slowing of metabolism due to cold (Heath, 1973) may have induced longer survival by reducing ventilation rate and consequently Zn uptake. Similarly, metabolic acceleration due to heat may have shortened survival by accelerating Zn accumulation.

Several studies have shown that as water temperature rises, waterborn toxicants became lethal to fish at lower concentrations. For example, heat stresses shortened $LC_{50}$s of goldfish exposed to lithium or ammonium ions (Powers, 1917), blue gills exposed to Zn (Burton *et al.*, 1972) and fiddler crabs exposed to cadmium (O'Hara, 1973). Similar results were also obtained by Bass *et al.* (1977).

### *Behavioural changes*

The loss of positive rheotaxis is a good indication of any toxic response, but in the case of Zn it takes place when poisoning is already irreversible. Signs of poisoning before loss of positive rheotaxis are not the same at high and lower concentrations; the air gulping and the increased opercular movement observed at high concentrations contrast with the general apathy and ataxia, but without apparent respiration difficulties observed at low concentrations. A comparable behaviour was reported by Matthiessen (1974) for *Sarotheron mossambicus*. An interpretation of the toxicity data is that two poisoning mechanism may take place, one occurring at high concentrations and provoking a rapid suffocation by destruction of the gill epithelium, the other prevailing at low concentrations and consisting of an inhibition of the main metabolic pathways.

### *Accumulation*

The present data indicate that the gills and livers contain high levels of Zn after the 96 hr exposure period. Therefore, it seems apparent that the concentration of Zn in the gill and liver can be used to detect acute Zn poisoning. The analyses of Zn-residues in muscles of both species show that they contained small amounts. These results agree with the observation of Windom *et al.* (1973), who found that seven out of eight species of chondrichthyes had higher Zn levels than in the muscles.

After a single injection of 20 mg Zn/kg to rats, Heilmaier *et al.* (1985) noticed that Zn increased metallothionein content in eight tissues, being most effective in the liver. Metallothionein induction by Zn was associated with an accumulation of Zn not bound to metallothionein.

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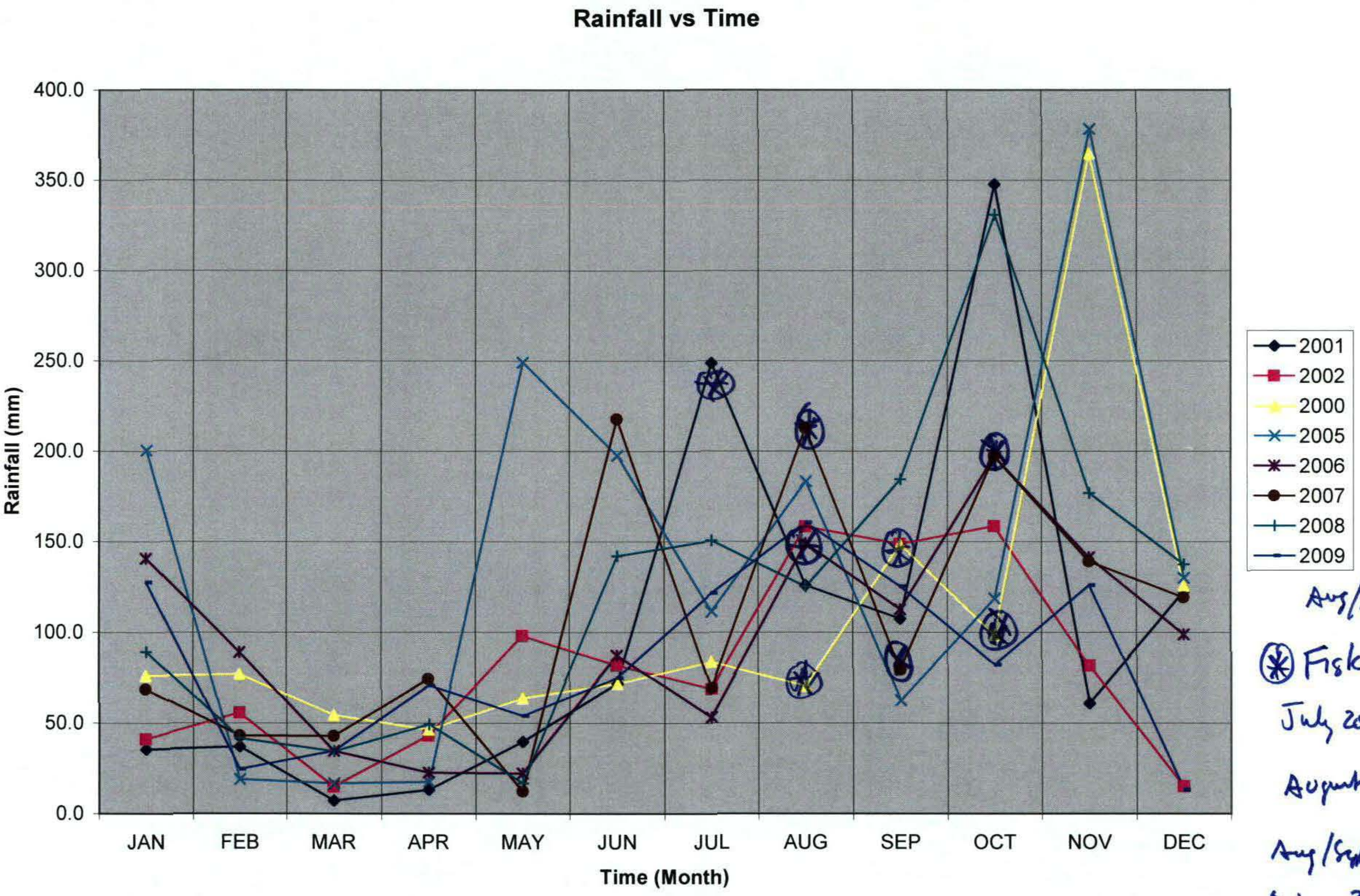
# ATTACHMENT 21

# Graph of Rainfall vs. Time for
# 2000, 2001, 2002, 2005, 2006, 2007, 2008, 2009

with

Documented Fishkill Events



Aug/Sept/oct 2000

⊛ Fiskill

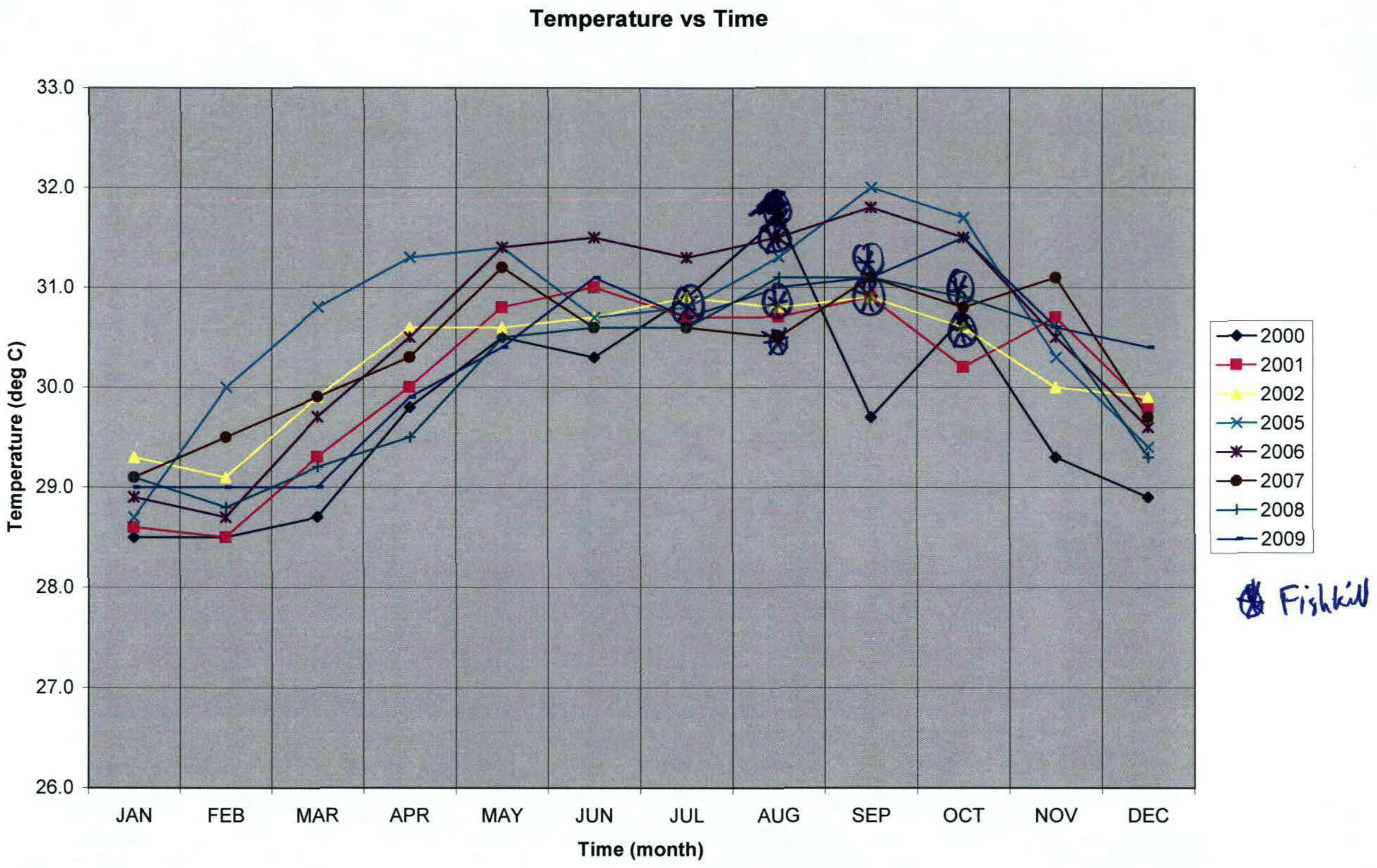
July 2001

August 2006

Aug/Sept/oct 2007

Oct 2008

Fall 2009

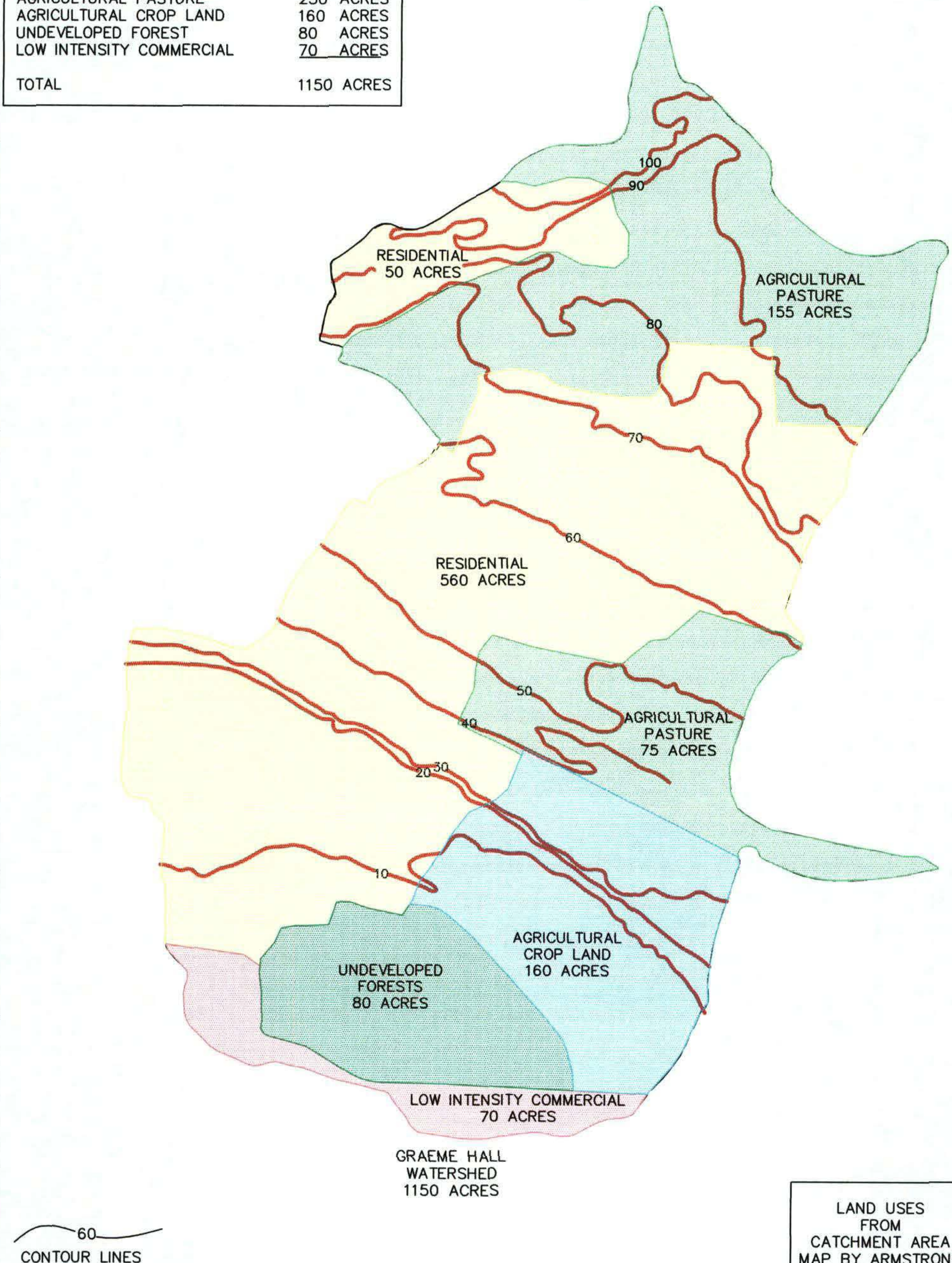

Temperature vs Time
33.0
32.0
31.0
30.0
29.0
28.0
27.0
26.0
Temperature (deg C)
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Time (month)
2000
2001
2002
2005
2006
2007
2008
2009
Fishkill

# ATTACHMENT 22

Stormwater Runoff Calculations
Prepared by EEC

Land uses and areas taken from Attachment 4C

| | |
|---|---|
| SINGLE FAMILY RESIDENTIAL | 610 ACRES |
| AGRICULTURAL PASTURE | 230 ACRES |
| AGRICULTURAL CROP LAND | 160 ACRES |
| UNDEVELOPED FOREST | 80 ACRES |
| LOW INTENSITY COMMERCIAL | 70 ACRES |
| TOTAL | 1150 ACRES |



LAND USES
FROM
CATCHMENT AREA
MAP BY ARMSTRONG

# Attachment 22

## Graeme Hall Catchment Area

## Current Stormwater Runoff Calculations

Catchment Basin Land Use Areas

| Land Use | Acres |
|---|---|
| Single-Family Residential | 610 |
| Agriculture (row crops) | 160 |
| Agriculture (pasture) | 230 |
| Undeveloped Forest Land | 80 |
| Low-Intensity Commercial | 70 |
| Total | 1150 |

Typical Runoff Concentrations for General Land Use Categories [1]

| Land Use Area | Total N (mg/L) | Total P (mg/L) | BOD (mg/L) | TSS (mg/L) | Copper (mg/L) | Lead (mg/L) | Zinc (mg/L) |
|---|---|---|---|---|---|---|---|
| Single-Family Residential | 2.07 | 0.327 | 7.9 | 37.5 | 0.016 | 0.004 | 0.062 |
| Agriculture (row crops) | 2.65 | 0.593 |  | 19.8 | 0.022 | 0.004 | 0.03 |
| Agriculture (pasture) | 3.47 | 0.616 | 5.1 | 94.3 |  |  |  |
| Undeveloped Forest Land | 1.15 | 0.055 | 1.4 | 8.4 |  |  |  |
| Low-Intensity Commercial | 1.18 | 0.179 | 7.7 | 57.5 | 0.018 | 0.005 | 0.094 |

[1] Obtained from Table 4-17 of "Evaluation of Current Stormwater Design Criteria within the State of Florida" prepared for FDEP, June 2007

|  | inches [2] |
|---|---|
| 2008 Annual Rainfall Total | 49.9 |

[2] Obtained from Barbados Meteorological Service for Grantley Adams Airport from 2000-2009

Calculated Annual Mean Runoff Volume

| Land Use Area | Runoff Coefficient [3] | Runoff Volume (in/yr) |
|---|---|---|
| Single-Family Residential | 0.202 | 10.08 |
| Agriculture (row crops) | 0.067 | 3.34 |
| Agriculture (pasture) | 0.067 | 3.34 |
| Undeveloped Forest Land | 0.067 | 3.34 |
| Low-Intensity Commercial | 0.633 | 31.59 |

[3] Obtained from Table 4-24 of "Evaluation of Current Stormwater Design Criteria within the State of Florida" prepared for FDEP, June 2007 assuming:
(1) the soils are most similar to the southeast coast of Florida (i.e. Cluster 5), and
(2) the soils are classified as shallow sandy soils (i.e. hydrologic soil group B).

Calculated Annual Mean Loading from each Land Use Area

| Land Use Area | Total N (lbs/yr) | Total P (lbs/yr) | BOD (lbs/yr) | TSS (lbs/yr) | Copper (lbs/yr) | Lead (lbs/yr) | Zinc (lbs/yr) |
|---|---|---|---|---|---|---|---|
| Single-Family Residential | 2883 | 455 | 11001 | 52220 | 22 | 6 | 86 |
| Agriculture (row crops) | 321 | 72 | 0 | 2399 | 3 | 0 | 4 |
| Agriculture (pasture) | 604 | 107 | 888 | 16423 | 0 | 0 | 0 |
| Undeveloped Forest Land | 70 | 3 | 85 | 509 | 0 | 0 | 0 |
| Low-Intensity Commercial | 591 | 90 | 3856 | 28794 | 9 | 3 | 47 |
| Total | 4468 | 727 | 15830 | 100344 | 34 | 9 | 137 |

# Attachment 22A

## Graeme Hall Catchment Area
## Future Stormwater Runoff Calculations for Proposed Land Use Change - Barbadian Agricultural Lands Development to Residential/Commercial

Catchment Basin Land Use Areas

| Land Use | Acres |
|---|---|
| Single-Family Residential | 745 |
| Agriculture (row crops) | 0 |
| Agriculture (pasture) | 230 |
| Undeveloped Forest Land | 80 |
| Low-Intensity Commercial | 95 |
| Total | 1150 |

Typical Runoff Concentrations for General Land Use Categories [1]

| Land Use Area | Total N (mg/L) | Total P (mg/L) | BOD (mg/L) | TSS (mg/L) | Copper (mg/L) | Lead (mg/L) | Zinc (mg/L) |
|---|---|---|---|---|---|---|---|
| Single-Family Residential | 2.07 | 0.327 | 7.9 | 37.5 | 0.016 | 0.004 | 0.062 |
| Agriculture (row crops) | 2.65 | 0.593 |  | 19.8 | 0.022 | 0.004 | 0.03 |
| Agriculture (pasture) | 3.47 | 0.616 | 5.1 | 94.3 |  |  |  |
| Undeveloped Forest Land | 1.15 | 0.055 | 1.4 | 8.4 |  |  |  |
| Low-Intensity Commercial | 1.18 | 0.179 | 7.7 | 57.5 | 0.018 | 0.005 | 0.094 |

[1] Obtained from Table 4-17 of "Evaluation of Current Stormwater Design Criteria within the State of Florida" prepared for FDEP, June 2007

|  | inches [2] |
|---|---|
| 2008 Annual Rainfall Total | 49.9 |

[2] Obtained from Barbados Meteorological Service for Grantley Adams Airport from 2000-2009

Calculated Annual Mean Runoff Volume

| Land Use Area | Runoff Coefficient [3] | Runoff Volume (in/yr) |
|---|---|---|
| Single-Family Residential | 0.202 | 10.08 |
| Agriculture (row crops) | 0.067 | 3.34 |
| Agriculture (pasture) | 0.067 | 3.34 |
| Undeveloped Forest Land | 0.067 | 3.34 |
| Low-Intensity Commercial | 0.633 | 31.59 |

[3] Obtained from Table 4-24 of "Evaluation of Current Stormwater Design Criteria within the State of Florida" prepared for FDEP, June 2007 assuming: (1) the soils are most similar to the southeast coast of Florida, and (2) the soils are classified as shallow sandy soils (soil group B).

Calculated Annual Mean Loading from each Land Use Area

| Land Use Area | Total N (lbs/yr) | Total P (lbs/yr) | BOD (lbs/yr) | TSS (lbs/yr) | Copper (lbs/yr) | Lead (lbs/yr) | Zinc (lbs/yr) |
|---|---|---|---|---|---|---|---|
| Single-Family Residential | 3521 | 556 | 13436 | 63777 | 27 | 7 | 105 |
| Agriculture (row crops) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Agriculture (pasture) | 604 | 107 | 888 | 16423 | 0 | 0 | 0 |
| Undeveloped Forest Land | 70 | 3 | 85 | 509 | 0 | 0 | 0 |
| Low-Intensity Commercial | 802 | 122 | 5233 | 39077 | 12 | 3 | 64 |
| Total | 4996 | 788 | 19642 | 119786 | 39 | 10 | 169 |

# Attachment 22A

## Graeme Hall Catchment Area

## Stormwater Runoff Calculations

**Current Estimate:**
Total Annual Mean Loading under existing site conditions:

| Total N (lbs/yr) | Total P (lbs/yr) | BOD (lbs/yr) | TSS (lbs/yr) | Copper (lbs/yr) | Lead (lbs/yr) | Zinc (lbs/yr) |
|---|---|---|---|---|---|---|
| 4468 | 727 | 15830 | 100344 | 34 | 9 | 137 |

**Future Estimate:**
Total Annual Mean Loading if 160 acres is converted from agriculture use to residential and commercial use:

| Total N (lbs/yr) | Total P (lbs/yr) | BOD (lbs/yr) | TSS (lbs/yr) | Copper (lbs/yr) | Lead (lbs/yr) | Zinc (lbs/yr) |
|---|---|---|---|---|---|---|
| 4996 | 788 | 19642 | 119786 | 39 | 10 | 169 |

**Future Differential:**
Increased Annual Mean Loading for proposed change in land use:

| | Total N (lbs/yr) | Total P (lbs/yr) | BOD (lbs/yr) | TSS (lbs/yr) | Copper (lbs/yr) | Lead (lbs/yr) | Zinc (lbs/yr) |
|---|---|---|---|---|---|---|---|
| | 528 | 61 | 3812 | 19442 | 5 | 2 | 32 |
| net change | + | + | + | + | + | + | + |

# ATTACHMENT 23

## Graeme Hall Sanctuary Water Quality and Barbados Proposed Water Quality Standards

# Marine Water Quality Standard

| | 2010 Graeme Hall Result (Avg) | Barbados Proposed Marine Standard | Parameter Notes | Human Health Effects |
|---|---|---|---|---|
| Enterococci (cols/100 ml) | 842 | 35 | Indication of waste from animals | Disease |
| Nitrate (mg/l) | 0.15 | 0.0098 | $NO_3$ oxide of nitrogen nutrient/fertilizer | Drinking water less than 10 ppm |
| Total phosphorus (mg/l) | 0.4 | 0.015 | Nutrient/fertilizer | Drinking water |
| Total suspended solids (mg/l) | 39 | 5 | Amount of material suspended in water column: sewage 200+/- | Drinking water less than 5 ppm |
| Chlorophyll-a (ug/l) | 33 | 0.0005 | Indicator of eutrophication | N/A |
| Turbidity (NTU) | 12.3 | 1.5 | Clarity of water | N/A |
| Zinc (ug/l) | 0.029 | 0.015 | Trace metal Bioaccumulation | Drinking water standard |
| Salinity (ppt) | 1.4 | n/a | Brackish 6-15 ppt<br>Seawater 30-35 ppt | N/A |
| Dissolved oxygen (mg/l) | 4.6 | 90% sat. (7.01 mg/l at 27.7°C, 3000 uS) | Greater than 5 mg/l for fish recommended | N/A |

# ATTACHMENT 24

## Resumes of Key Personnel

# ROBERT E. WALLACE III, P. E.
## PRESIDENT

Mr. Wallace has comprehensive environmental engineering, testing and design experience of over thirty-five years. Mr. Wallace has set himself above the rest by becoming a knowledge base for all aspects of environmental engineering. Areas of specialization include, but are not limited to; Environmental Audits, Water Resources Engineering, Wastewater Collection, Treatment and Disposal Design, Wastewater Operations and Management, Environmental Permits, Water Quality Measurement, Site Development Design, Air Source Design and Permitting, Sound Level Measurement, Industrial Wastewater Design, Radon Measurement, Waste Solidification, and asbestos Surveys - Management Plans. Mr. Wallace sets new standards with his focus, continued training and genuine concern for the environment.

### EDUCATION

Bachelor of Science in Environmental Engineering, Univ. of South Florida, 1974

### PROFESSIONAL LICENSURE

Professional Engineering License, Florida #21608
Professional Engineering License, Georgia #15249
Professional Engineering License, Alabama #15185
Professional Engineering License, Indiana #208727
Professional Engineering License, Tennessee #21134
Professional Engineering License, Puerto Rico #14521

### TRAINING AND CERTIFICATIONS

Asbestos Abatement Supervisor - EPA Certified
Asbestos Building Survey - EPA Certified
Asbestos Management Plan - EPA Certified
Certified Environmental Manager, #33624
Certified Operator, Class C, Wastewater #2627
Certified for Noise Measurement and Control
Florida Asbestos Consultant - #EA00024
Hazardous Materials Site Safety - OSHA 40 Hour Requirement
Radon Measurement Technician - RO236
Water Well Contractor, #2877

### PROJECT EXPERIENCE

Engineering design including land use planning and site development design for: water supply and distribution, wastewater collection and treatment and stormwater collection and treatment.

Industrial wastewater pretreatment, treatment and disposal systems including oils, laundry, heavy metals, phosphate tailings, organic chemicals and acidic wastewaters. Designed state of the art treatment system for petroleum wastewater to meet strict ocean discharge standards.

Indoor Air Quality Investigations for sick buildings and worker exposure to indoor contaminants. Participated in discovery and correction of severe carbon monoxide episode in industrial plant.

Conduct Environmental Audits for residential, commercial, industrial and undeveloped land for environmental liability control for lending institutions and buyers.

Air Source Design and Permitting for numerous sources with a variety of control equipment such as cyclones, baghouses, water scrubbers, incinerators and vapor combustor.

Instrumental in obtaining environmental permitting in Hillsborough County of the first cypress wetlands to be used for treated wastewater renovation and recycle. Design and mitigation of wetland uses and enhancements. Restoration projects designed and maintained.

Stormwater Sampling and Design of systems for the effective treatment of urban runoff. Numerous design for stormwater management in both quantity and quality consideration. Authored, "Water Quality Element of Downtown Miami Area Wide DRI."

Sound Level Measurement for County Ordinance compliance in commercial and industrial establishments as well as OSHA worker exposure measurement for industry.

Investigated and designed remedial action plans for Hazardous Waste involving contaminant, treatment and disposal systems. Designed Solidification project for 10,000 cy of sludge and soil for on-site remedial action and utilized solidified mass for a parking lot base.

Groundwater contamination studies to determine the extent of plume movement. Designed containment, treatment and disposal systems.

Asbestos Abatement Project Manager for monitoring removal of chrysotile asbestos fire-proofing from historic building in St. Petersburg, Florida. Performed building inspections and management plans for commercial and industrial clients.

Federal Wastewater 201 Construction Grants Program Manager; responsible for three planning areas in Hillsborough County. The South Hillsborough 201 Plan was presented as a model for efficient plan completion at a FDER/EPA sponsored seminar.

Conducted on volunteer basis a series of dye trace and water quality tests on the Sulphur Springs System in North Tampa. These tests investigated the interconnection of sinkholes, established travel times and proved stormwater to be the source of bacterial contamination of the closed Sulphur Springs Pool.

Designed and Permitted Construction and Demolition Debris landfill facilities and other Solid Waste Disposal Systems including incineration and transfer. Active interest in leaf and yard waste recycling.

Environmental Wastewater Permitting for the Hillsborough County Environmental Protection Commission, including point source water quality monitoring, intensive stream surveys, and wasteload allocation modeling.

Construction and design coordinator of expansion of the University of South Florida Wastewater Treatment Facility to 3.5 MGD and installation of the Brewery Waste Pretreatment Lagoon and the Beach Park Collection System for the City of Tampa.

## EMPLOYMENT

| | |
|---|---|
| 1979 – Present | President, Environmental Engineering Consultants, Inc. |
| 1978 to 1979 | Civil Engineer, Hillsborough County Division of Public Utilities (Florida) |
| 1976 to 1978 | Environmental Engineer, Hillsborough County Environmental Protection Commission |
| 1975 to 1972 | City of Tampa Department of Sanitary Sewers |

# RICHARD PRYOR, P.G.
## SENIOR ENVIRONMENTAL SCIENTIST

Mr. Pryor has over twenty-five years of experience utilizing his knowledge of environmental assessments, testing, compliance and geology. Areas of specialization include, but are not limited to: Soil and Ground Water Testing, Interpretation and Reporting, Monitoring Well Installation, Remedial Systems Design, Groundwater Modeling, C & D Debris Landfill Permitting, Underground and Aboveground Storage Tank Regulations, Petroleum Cleanup Regulations, Hazardous Waste Regulations, and Stormwater Regulations. Mr. Pryor has been instrumental in interpreting results into compliance reporting for our clients. Mr. Pryor is committed to the environment and has demonstrated his knowledge and professionalism in his written contributions to journals and newsletters.

### EDUCATION

University of South Florida, Tampa, FL.
Coursework:
Remedial Action (Graduate class), 1994
Advanced Hydrogeology (Graduate class), 1992
Introduction to Hydrogeology (Undergraduate class), 1990

Bachelor of Science in Geology, Univ. Waterloo, Waterloo, Canada, 1983

### PROFESSIONAL LICENSURE

Professional Geologist #0001897, 1996

### TRAINING AND CERTIFICATIONS

SWFWMD Well Drilling Contractors License #9193 (1991)
OSHA 40 Hour Hazardous Site Safety Training (1991)
OSHA 8 Hour Refresher (Updated through 2007)
ASTM Groundwater and Vadose Zone, Monitoring and Sampling Technology (1991)
Copper and Lead Rules, Hillsborough County HRS (1993)
FDEP Requirements for: Above and Underground Storage Tank Management, Nationwide Institute for Storage Tank Management (1999)
FDEP Bureau of Laboratories, SOP for Field Sampling (2002)
FDEP P2 Pollution Prevention Conference (1998)
NWWA: Designing In-situ Waste Recovery Systems (1991)
Regenesis Bioremediation (1997)
Florida Remediation Conference (2001 – 2006)
How to Comply with Hazardous Waste Regulations (1991)

# RICHARD PRYOR, P.G.
## SENIOR ENVIRONMENTAL SCIENTIST

## PROJECT EXPERIENCE

Numerous assessments and reports in compliance with FDEP Storage Tank and Petroleum Cleanup and Brownfield regulations and Consent Orders, including Site Assessment Reports, Remedial Action Plans, and Pre-approval Packages. Designed and deployed groundwater remediation systems involving injection of oxygen releasing materials, potassium lactate, activated carbon, air strippers, sparge tanks, recovery wells, injection wells, and natural attenuation.

Written and performed numerous Phase II Audits for real estate transactions. Permitting of three construction and demolition debris landfills. Permitting of wastewater treatment plants. Performed numerous inspections for hazardous waste rules compliance.

NPDES compliance: Preparation of stormwater pollution prevention plans and performance of sampling in compliance with federal stormwater regulations.

SPCC compliance: Performed inspections and preparation of Spill Prevention Control and Countermeasure Plans and necessary updates.

SWFWMD: Participated in design and permitting of storm water retention and conveyance systems. Hold SWFWMD contractors license for drilling.

## EMPLOYMENT

| | |
|---|---|
| 1989 to Present | Professional Geologist/ Senior Environmental Scientist, Environmental Engineering Consultants, Inc. |
| 1981 to 1984 | Assistant Geologist, Canamax Resources<br>Toronto, Ontario, Canada |

# ANGELO TULIMIERI

**EDUCATION** B.A., Interdisciplinary Natural Sciences-Biology, University of South Florida, 2000
B.A., Mass Communications, University of South Florida, 1971

## PROFESSIONAL EXPERIENCE

Self-employed since 1991, dealing successfully with controversial wetland issues that arise between owner's rights and public agencies. Duties include delineating wetland lines including ACOE lines, resolving wetland permitting issues, designing wetland mitigation and restoration, preparing wetland planting bids and work contracts, providing project management, conducting listed species surveys, and coordinating with individuals, developers, regulators, geologists, soil scientists, engineers, surveyors, lawyers, executives and technicians.

Advise applicants and/or permittees concerning regulatory requirements, including jurisdiction, processing, evaluation, and the likelihood of project approval.

Prepare detailed site evaluations to establish base environmental conditions including wetland delineations and characterization of biological and physical features and concerns.

Prepare jurisdictional determinations, including ACOE wetlands delineations and characterizations to satisfy requirements of the General Permit.

Reviewed site plans proposed for rezoning and subdivisions, commercial, and industrial projects as regarded the protection of wetlands. Responsible for the approval or denial of site plans for projects ranging upwards of 1,000 acres or more in size in regard to wetland protection. Identified problem areas for environmentally sensitive projects in relation to proposed dredging and filling, and/or the discharge of dredged or fill materials into wetlands and waters of the State and/or the U.S.

Delineated tens of thousands of linear feet of wetland lines and recommended for approval hundreds of wetland related land alteration permits after appropriate review and modification. Training included delineating wetlands, evaluating wetland mitigation justification and success; performing ecological assessments; analyzing site plans; interpreting aerial photos and maps (topographic, vegetation, and soils); identifying hydric soils; reviewing and commenting on permits and site plans; and applying environmental policy. Cross training included the use of the 1987 COE Wetland Delineation Manual with the ACOE, and hydric soil identification with the Soil Conservation Service (now known as the NRCS). Assisted in developing the EPC's in-house Standard Operating Procedures Manual.

Monitored the implementation of special conditions of permits, such as reporting requirements or compensatory mitigation, providing consultation and approvals as appropriate, evaluating proposed or required changes, and modifying permits when necessary to reflect revised conditions/requirements.

### Employment

1991 – present – Plant Ecologist/Environmental Scientist – Tampa Bay region, FL
1991 & 1987-1989 – Environmental Scientist – EPC Hillsborough County, FL
1990 – Environmental Specialist – EPC Hillsborough County, FL
1989 – 1990 – Research Assistant – Center for Wetlands, UF, Gainesville, FL
1986 – Naturalist – Hillsborough Community College, FL