

## LOWER SWIFT CREEK WATER QUALITY REPORT

# Complete 540 Triangle Expressway Southeast Extension

#### Wake and Johnston Counties

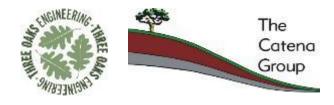
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#### 1.0 INTRODUCTION

The North Carolina Turnpike Authority (NCTA) of the North Carolina Department of Transportation (NCDOT) proposes construction of a new road corridor from NC-55 (Apex) East to US-64 Bypass (Knightdale). Dwarf Wedgemussel (*Alasmidonta heterodon*, DWM), which is listed by the US Fish and Wildlife Service (USFWS) as a federally endangered species, occurs in Swift Creek of the Neuse River Basin within the proposed action area of the project. It was first documented to occur in Swift Creek in 1991.

To update the environmental baseline for the DWM population in Swift Creek, a multi-tier study was conducted to determine the viability of this population. This report addresses water quality conditions in the Swift Creek Watershed (SCW) to assist in determining if conditions are sufficient to continue to support DWM. The historical range of DWM extends 23 miles from above the Wake/Johnston County line to Swift Creek Road in Johnston County. The study area for this report includes the historical range, which extends from Lake Benson to the confluence with the Neuse River, and is referred to here as Lower SCW.

As detailed in the Phase 1 Dwarf Wedgemussel Viability Study completed for this project by Three Oaks Engineering/The Catena Group (Catena 2014), there are limited water quality datasets in the Lower SCW. Therefore, greater efforts were made to gather water quality information for the Lower SCW, particularly in regard to parameters that threaten the DWM, such as pH, dissolved oxygen (DO), ammonia, and copper.

#### 1.1.Background

Under the Clean Water Act, the U.S. Environmental Protection Agency (EPA) recommends levels of ambient water quality concentrations to protect aquatic organisms living in surface waters. These levels are developed by determining the effects of pollutants on aquatic organisms. An aquatic life criterion is set at the highest concentration of a pollutant that is not expected to pose a significant threat to the majority of species in a given environment. Given the sensitivity of freshwater mussels' life cycle, means of consuming food, and inability to move long distances, there is concern that certain water quality criteria might not protect mussels from dangerous levels of some pollutants.

The North Carolina Division of Water Resources (DWR, formerly the Division of Water Quality) is responsible for managing North Carolina's surface waters. Effective January 1, 2015, North Carolina has adopted water quality standards for several dissolved metals, including copper. Though the EPA has not yet approved these standards, for the purposes of this report, they will be used as the water quality standards for copper (USEPA 2007, NC Register 2014). Similar standards for copper have been accepted by EPA for recommended water quality criteria, so the newly adopted NC rules will likely get approved. There are no state water quality

standards for ammonia, so the EPA approved water quality criteria will be used for analysis of ammonia (USEPA 2013).

Several studies have examined methods for determining toxicity levels of certain water quality parameters on freshwater mussels. A discussion of two of these methods follows. The first study (Ward et al. 2007) examines both copper and ammonia ambient concentrations and implications for toxicity. The second study (Augspurger 2012) focuses on copper, which the Ward study identifies as the most significant pollutant to freshwater mussels in the SCW.

#### 1.2. Previous Studies

Ward et al. (2007) examined water quality by analyzing copper, ammonia, and chlorine in three river basins in NC that contain either DWM or Carolina Heelsplitter (*Lasmigona decorata*), both endangered freshwater mussels. Along with several sampling locations in the SCW, they also sampled in Fishing Creek (part of the Tar-Pamlico River basin) and Goose Creek (part of the Yadkin-Pee Dee River basin). Sampling was conducted at five sites in each drainage basin, with varying proximity to wastewater treatment facilities (often sources of contamination). Samples were collected every two months for one year, usually during base flow conditions (not during storm events). In addition to DO, temperature, pH, and total residual chlorine (measured in the field), total ammonia and total recoverable copper were analyzed. Additionally, ammonia and copper data were obtained from DWR ambient monitoring stations in each of the three drainage basins.

Ammonia toxicity is dependent on temperature and pH. The 2007 Ward et al. study used EPA's "1999 Update of ambient water quality criteria for ammonia" and mussel toxicity data to determine acute and chronic concentrations of ammonia that should not harm mussels based on site-specific pH (USEPA 1999).

Copper toxicity is influenced by pH, dissolved organic carbon, water hardness, sodium, potassium, sulfate, chloride, alkalinity, and temperature. The EPA's "1996 Water quality criteria documents for the protection of aquatic life in ambient water", which was based only on water hardness, was used to determine acute and chronic concentrations that should not harm mussels based on site-specific hardness (USEPA 1996). The "2007 EPA updated aquatic life criteria for copper" uses a biotic ligand model (BLM), which requires several more parameters than were available for the Ward study (see Section 1.3 for more details, USEPA 2007).

In measuring concentrations of the three parameters in the three river basins, Ward et al. (2007) found that Goose Creek had the most elevated ammonia concentrations. Copper was less than or equal to 10 ug/L in all but 7 of the 95 samples, all 7 of which occurred in Goose Creek on one day during a heavy storm event, indicating that the elevated levels were likely due to an increase in suspended sediment in the stream. Chlorine was detected less frequently than ammonia or

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copper. The median chlorine level was below the method detection limit (MDL) (5.7 ug/L), yet several samples were above 200 ug/L. These elevated samples were in Tar River and Goose Creek and below Waste Water Treatment Plants.

While risk of exposure to all parameters was highest in Goose Creek, copper concentrations were concerns in all three drainages, including Swift Creek. Chlorine concentrations were infrequently a concern, and risks associated with periodic spikes were not well understood.

#### 1.3. Biotic Ligand Model

Metal toxicity and biological availability is known to be dependent on water chemistry (Adams and Chapman 2007). HydroQual developed a method for determining metal toxicity using the BLM (HydroQual 2005). This model incorporates a total of 12 water quality parameters to analyze how metal toxicity changes at the biotic ligand, or the site of action on an aquatic organism. This model is thought to more accurately represent the sensitivity of freshwater mussels to metals, and it was incorporated into the EPA's revised water quality criteria in 2007 (USEPA 2007).

A study by Augspurger (2012) analyzed copper concentrations in the Goose Creek watershed in Union County, NC, the same watershed examined in the 2007 Ward study, and evaluated the potential for toxicity using the BLM. This 2012 study found that Goose Creek copper concentrations did not exceed acute or chronic concentrations as derived from the BLM. A sensitivity analysis of the BLM indicated pH and dissolved organic carbon were the most influential of the 12 water quality parameters on the outcome of the BLM analysis. These papers form the foundation of the water quality analysis performed here. The BLM was published after the Ward study, so it could not be used to analyze the data from the Ward study.

#### 2.0 METHODS

#### 2.1. Water Quality Data Collection

Water quality sampling in the Lower SCW was performed at three locations; Swift Creek crossings of NC 50 (Benson Road), SR 1555 (Barber Mill Road), and NC 210 (Figure 1). The sites were selected for ease of access and it is the opinion of Three Oaks that water quality conditions at these locations are indicative of the current occupied range of DWM in Swift Creek. These sampling sites are believed to represent the range of conditions in the watershed in terms of habitat conditions and flow conditions. At the upper most site (NC 50), Swift Creek is largely influenced by development. As the stream flows southeast, it moves further from urban areas and becomes more stable. Samples were collected from November 2014 through July 2015. Water quality parameters that were measured are listed in Table 1.

Table 1. Water quality parameters measured in Lower SCW.

Field Parameters	<u>Laboratory Parameters</u>
Dissolved Oxygen	Calcium (Ca)*
Temperature*	Magnesium (Mg)*
Conductivity	Sodium (Na)*
pH*	Potassium (K)*
	Sulfate as SO <sub>4</sub> *
	Chloride (Cl)*
	Total Alkalinity (as CaCO <sub>3</sub> )*
	Dissolved Organic Carbon (DOC)*
	Copper (Total and dissolved*)
	Lead
	Nickel
	Zinc
	Cadmium

<sup>\*</sup> indicates parameters used in the BLM to predict copper toxicity to freshwater mussels

Water samples were collected a total of eight times from each site over the course of the sampling period: once during each season, twice during a high-flow event (when flow at USGS gauge 0208773375 was >50% above the median daily statistic), and twice during a low-flow event (when flow at the same gauge was <50% below the median daily statistic) (Table 2). While extreme flow conditions were not observed, a range of flows are represented by the days on which sampling occurred.

Table 2. Dates of sampling events and approximate flows during each event

<b>Date Sampled</b>	Sites Sampled	Flow (in cfs)	Median Daily Discharge*	Flow Category**
Nov 4, 2014	NC 210, NC 50	30	33	Base
Nov 19, 2014	NC 210, SR 1555, NC 50	50	27	Base/High
Dec 16, 2014	SR 1555	38	34	Base
Feb 6, 2015	NC 210, SR 1555, NC 50	100	110	Base
April 7, 2015	NC 210, SR 1555, NC 50	47	79	Base/Low
May 7, 2015	NC 210, SR 1555, NC 50	39	112	Low
June 9, 2015	NC 210, SR 1555, NC 50	11	50	Low
July 1, 2015	NC 210, SR 1555, NC 50	53	11	High
July 10, 2015	NC 210, SR 1555, NC 50	127	15	High

<sup>\*</sup>Median Daily Discharge is based on 6 years of data

Field parameters were measured at the time of sampling by use of a multi-parameter meter (YSI Professional Plus, Yellow Spring, OH, USA). For all parameters, grab samples were collected from visibly flowing portions of the stream (not in stagnant pools), approximately one meter away from the bank toward mid-channel. All samples were stored on ice (at ~4°C) in the field and taken the same day to ENCO Laboratory (Cary, NC) for analysis.

Grab samples for ammonia were collected in chemically cleaned 250mL polyethylene bottles and acidified with concentrated sulfuric acid ( $H_2SO_4$ ) to pH <2. Ammonia as nitrogen was measured by the semi-automated colorimetry method following protocols described in EPA

<sup>\*\*</sup>Flow at time of sampling varied slightly, so several samples were on the line between base flow and low flow or base flow and high flow. These values are approximate.

method 350.1 (USEPA 1993a). Quality control for ammonia measurements included analyses of reagent blanks, matrix spike, and duplicate matrix spike. The MDL was 0.045 mg/L.

Grab samples for copper were collected unfiltered in chemically cleaned 250 mL polyethylene bottles and acidified with nitric acid (HNO<sub>3</sub>). Total copper and dissolved copper were measured by the inductively coupled plasma-atomic emission spectrometry method following protocols described in EPA method 6010C (USEPA 2000). Quality control for copper measurements included analyses of reagent blanks, a laboratory control sample, matrix spike, duplicate matrix spike, and post spike. The MDL was 1.60 ug/L.

Grab samples for dissolved organic carbon (DOC) were collected in chemically cleaned 250ml polyethylene bottles. Dissolved organic carbon was measured by the high-temperature combustion method described in Standard Method 5310 B (SM 5310B-2000). Quality control for DOC measurements included analyses of reagent blanks, a laboratory control sample, matrix spike, and duplicate matrix spike. The MDL was 0.32 mg/L.

Grab samples for cadmium, calcium, lead, magnesium, nickel, potassium, sodium, and zinc were collected in chemically cleaned bottles. These ions were measured by the inductively couple plasma-atomic emission spectrometry method following protocols described in EPA method 6010C (USEPA 2000). Quality control for these measurements included analyses of reagent blanks, a laboratory control sample, matrix spike, duplicate matrix spike and post spike. The MDL for cadmium was 0.36 ug/L. The MDL for calcium was 39.0 ug/L. The MDL for lead was 2.10 ug/L. The MDL for magnesium was 23.0 ug/L. The MDL for nickel was 1.80 ug/L. The MDL for potassium was 150 ug/L. The MDL for sodium was 400 ug/L. The MDL for zinc was 3.80 ug/L.

Grab samples for chloride and sulfate were collected in chemically cleaned bottles. These ions were measured by the ion chromatography method described in EPA method 300 (EPA 1993b). Quality control for the ion measurements included analyses of reagent blanks, a laboratory control sample, matrix spike, and duplicate matrix spike. The MDL for chloride was 2.2 mg/L. The MDL for sulfate was 2.9 mg/L.

#### 2.2. Toxicity Analysis

The toxicity of ammonia and copper were analyzed using the most up to date methods. The first method simply compares the measured concentration of each parameter to the NC water quality standard (for copper, based on the EPA criteria for that parameter, "Aquatic Life Ambient Freshwater Quality Criteria – Copper, 2007 Revision") and the EPA criteria for ammonia ("Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater, 2013"). Additionally, the BLM method was used to evaluate the potential for copper toxicity.

Water samples collected for this study were evaluated using BLM in Water Quality Criteria Calculation mode. Using the model in this mode analyzes the parameters in Table 2 (with an asterisk) to adjust the EPA acute and chronic water quality criteria for protection of aquatic species to local water quality conditions. The criteria that the BLM predicts are then compared to dissolved copper concentrations. If dissolved copper was not detected in a sample, the total copper concentration was multiplied by a conversion factor of 0.96. If neither dissolved nor total copper was detected, then the model was not run.

#### 3.0 RESULTS AND DISCUSSION

All water sample analyses were completed with quality control / quality assurance samples (blanks, spikes, duplicates). Review of quality assurance data indicates acceptable precision and accuracy for most analyses. The laboratory blank sample for copper analysis contained low levels of copper (2.56 ug/L and 3.11 ug/L for total and dissolved copper, respectively) on one of the sampling dates (April 7, 2015). The three samples from that day were reported with some of the highest concentrations of copper from the study (between 4.13 ug/L and 5.91 ug/L). The spiked and duplicate samples were reported with acceptable recovery. It is possible that some of the copper in these samples is a result of laboratory contamination, or that the laboratory blank was contaminated but the samples were accurate. It is impossible to know for sure. For data analysis purposes, we are assuming that all the copper in the April 7<sup>th</sup> samples is from Swift Creek. Another way to interpret these results is to assume an extra 2.56-3.11 ug/L of copper were in the samples and subtract that amount out of the final result. The significance of these results will be discussed further in Section 3.3.

The laboratory blank sample for zinc and nickel analysis contained low levels of zinc and nickel from samples taken on November 4, 2014. Samples did not contain high levels of zinc or nickel, so we assumed that those samples were not compromised. There was poor matrix spike and matrix spike duplicate recoveries for DOC, chloride, sulfate, magnesium, sodium, alkalinity, and ammonia on several occasions, but in each instance, the batch was accepted for these analytes based on the laboratory control spike recoveries. Laboratory reports provided by ENCO for sample analysis are in Appendix B.

#### 3.1. Environmental Exposure Concentrations

Copper concentrations gathered for this report are summarized in Table 6 (along with BLM-derived criteria concentrations, which are discussed in Section 3.3). Total copper was detected in half of the samples, while dissolved copper was detected in about a third (MDL for both analyses is 1.60 ug/L). Four of these samples exceeded the chronic event-specific North Carolina water quality standard for copper (derived from hardness levels measured at each sampling event). Additionally, three of these samples exceeded the acute event-specific water quality standard for copper. The elevated concentrations of copper appear to occur during lower

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flow rates, which is typically contrary to what would be expected; that copper levels spike during significant rain events when sediment loads into streams increases.

Ammonia concentrations gathered for this study are summarized in Table 3. Ammonia was detected in 11 of 24 samples collected (MDL is 0.045 mg/L). None of these samples exceeded the event-specific chronic or the acute criteria (USEPA 2013).

Table 3. Ammonia concentrations in Swift Creek during 2014-2015 sampling events and corresponding CMC and CCC values in mg/L (USEPA 2013).

Location	Flow	Sampling Date	Ammonia as N	pH (SU)	Temp (°C)	<u>CMC</u>	CCC
NC 50	Base	11/4/14	0.063	6.51	14.8	32.5	2.97
NC 50	Base/High	11/19/14	0.25	7.22	9.1	19.3	3.44
NC 50	Base	2/6/15	< 0.045	7.15	6.6	20.8	4.20
NC 50	Base/Low	4/7/15	< 0.045	7.32	18.4	13.6	1.77
NC 50	Low	5/7/15	0.051	6.86	22.5	15.2	1.68
NC 50	Low	6/9/15	0.072	7.01	25.7	10.4	1.30
NC 50	High	7/1/15	< 0.045	7.42	29.7	4.64	0.80
NC 50	High	7/10/15	0.069	7.17	29.8	6.29	0.93
SR 1555	Base/High	11/19/14	0.35	7.23	5.9	19.1	4.20
SR 1555	Base	12/16/14	< 0.045	-	-	-	1
SR 1555	Base	2/6/15	< 0.045	7.28	5.2	17.9	4.26
SR 1555	Base/Low	4/7/15	< 0.045	7.23	17.7	16.0	1.96
SR 1555	Low	5/7/15	0.078	6.81	21	17.8	1.88
SR 1555	Low	6/9/15	< 0.045	7.05	24	11.5	1.43
SR 1555	High	7/1/15	0.073	7.14	26.2	8.76	1.19
SR 1555	High	7/10/15	0.06	7.02	27.7	8.70	1.14
NC 210	Base	11/4/14	< 0.045	6.56	10	31.8	4.02
NC 210	Base/High	11/19/14	0.58	8.16	5.7	4.13	1.53
NC 210	Base	2/6/15	< 0.045	7.56	5.2	12.1	3.43
NC 210	Base/Low	4/7/15	< 0.045	7.38	17.6	13.3	1.79
NC 210	Low	5/7/15	0.06	7.12	20	15.0	1.79
NC 210	Low	6/9/15	< 0.045	7.47	23.6	7.16	1.13
NC 210	High	7/1/15	< 0.045	6.98	25.5	10.8	1.33
NC 210	High	7/10/15	< 0.045	7.5	26.1	5.57	0.94

No sample exceeds the event-specific acute or chronic criteria according to USEPA 2013 recommended criteria.

Other metals and compounds were analyzed for this study, statistical information for which is provided in Table 4 along with corresponding North Carolina water quality standards (NCDWR 2003, NC Register 2014). As illustrated in Table 4, none of the provided parameters exceeded North Carolina water quality standards.

Table 4. Statistical information for other metals and compounds analyzed for this study, as compared to water quality standards (NCDWR 2003).

<u>Parameter</u>	Median concentration	<u>Maximum</u> concentration	NCDWR Water Quality Standard
Cadmium (ug/L)	0.36	0.36	2
Chloride (mg/L)	7.25	11	230
Lead (ug/L)	<2.10*	<2.10*	25
Nickel (ug/L)	2.02	2.02	88
Sulfate (mg/L)	3.85	4.9	250
Zinc (ug/L)	6.14	16.7	50

<sup>\*</sup>indicates MDL

#### 3.2. Ward et al. Ammonia Update

Ammonia concentrations documented in the 2007 Ward et al. study have been updated with the EPA 2013 water quality criteria, using both pH and temperature measurements. Table 5 provides the event-specific CMC and CCC for ammonia expected to be protective for freshwater mussels (USEPA 2013). None of these samples exceeded the event-specific chronic or the acute criteria (USEPA 2013).

Table 5. Ammonia concentrations measured in Ward et al. from 2002-2003 compared to CMC and CCC (USEPA 2013).

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Sample Site	<u>Date</u>	Ammonia as N	pH (SU)	Temp (°C)	<u>CMC</u>	CCC
SC1	07/11/02	0.10	7.1	28.5	7.54	1.05
SC1	09/30/02	0.14	6.3	23.0	18.82	1.79
SC1	01/09/03	0.32	6.4	7.5	33.74	4.82
SC1	03/19/03	0.06	7.1	5.0	21.94	4.76
SC1	05/12/03	0.30	7.3	25.2	7.91	1.16
SC1	07/16/03	0.07	6.9	27.2	10.01	1.23
SC2	07/11/02	0.11	7.0	24.5	11.54	1.41
SC2	09/30/02	0.09	6.6	21.8	18.74	1.87
SC2	01/09/03	0.45	7.0	7.5	24.10	4.22
SC2	03/19/03	0.02	7.1	4.7	21.94	4.85
SC2	05/12/03	0.18	7.0	23.0	13.07	1.56
SC2	07/16/03	0.10	6.9	25.9	11.15	1.34
SC3	07/11/02	0.06	7.2	26.0	8.34	1.17
SC3	09/30/02	0.14	7.1	22.0	12.93	1.59
SC3	01/09/03	0.04	6.7	8.8	29.76	4.24
SC3	03/19/03	0.02	7.0	5.0	24.10	4.96
SC3	05/12/03	0.14	7.0	23.2	12.86	1.54
SC3	07/16/03	0.07	6.9	26.0	11.06	1.33
SC4	07/11/02	0.04	7.1	25.4	9.75	1.28
SC4	09/30/02	0.10	7.4	23.0	8.32	1.25
SC4	01/09/03	0.03	7.3	8.2	17.51	3.47
SC4	03/19/03	0.02	7.1	6.5	21.94	4.32
SC4	05/12/03	0.10	7.1	23.5	11.42	1.44
SC4	07/16/03	0.04	7.1	25.0	10.08	1.31
WO1	07/11/02	0.04	7.1	24.5	10.51	1.35
WO1	09/30/02	0.03	6.8	21.0	17.95	1.88
WO1	01/09/03	0.02	6.7	7.2	29.76	4.70
WO1	03/19/03	0.02	6.8	5.2	28.05	5.22
WO1	05/12/03	0.10	6.8	22.0	16.52	1.77
WO1	07/16/03	0.02	6.6	24.0	15.61	1.62
WO2	07/11/02	0.05	7.0	23.0	13.07	1.56

No sample exceeds the event-specific acute or chronic criteria according to USEPA 2013 recommendations.

#### 3.3.BLM Analysis

Table 6 provides the copper concentrations for each sampling event and compares them to the state water quality standards, and also provides the BLM-derived event specific criteria for comparison. Only one sample result exceeded either the CMC or CCC, the NC 50 crossing of Swift Creek on November 19, 2014. The CMC and CCC values vary between sampling events, indicating changing conditions in the watershed over time (and throughout seasons), and between sampling sites.

Table 6. Comparison of Swift Creek total and dissolved copper concentrations to water quality criteria and BLM-derived CMC and CCC (in ug/L)

Location	Flow	<b>Sampling</b>	<u>Total</u>	<b>Dissolved</b>	NCDWR	<u>NCDWR</u>	CMC	CCC
Location		<u>Date</u>	<b>Copper</b>	<u>Copper</u>	Acute std	Chronic std	CIVIC	ccc
NC 50	Base	11/4/14	1.98	<1.60	3.10	2.36	4.79	2.98
	Base/High	11/19/14	<1.60	1.96**	3.35	2.54	1.96	1.22
	Base	2/6/15	2.46	2.24*	2.91	2.23	12.02	7.47
	Base/Low	4/7/15	5.91	4.92*	3.90	2.92	18.94	11.77
	Low	5/7/15	2.03	1.75	3.49	2.64	9.35	5.81
	Low	6/9/15	5.53	2.79	4.36	3.23	11.72	7.28
	High	7/1/15	<1.60	<1.60	4.12	3.06	21.89	13.59
	High	7/10/15	<1.60	<1.60	4.06	3.03	15.22	9.45
SR 1555	Base/High	11/19/14	<1.60	<1.60	3.56	2.68	1.21	0.75
	Base	12/16/14	<1.60	<1.60	3.39	2.57	12.32	7.66
	Base	2/6/15	2.75	<1.60	3.00	2.30	12.18	7.56
	Base/Low	4/7/15	4.13	4.17*	3.71	2.79	13.01	8.08
	Low	5/7/15	<1.60	<1.60	3.23	2.46	7.04	4.37
	Low	6/9/15	1.69	<1.60	3.79	2.84	8.85	5.50
	High	7/1/15	<1.60	<1.60	3.90	2.92	12.82	7.96
	High	7/10/15	<1.60	<1.60	3.48	2.63	10.59	6.58
NC 210	Base	11/4/14	<1.60	<1.60	3.82	2.86	4.20	2.61
	Base/High	11/19/14	<1.60	<1.60	3.82	2.86	3.14	1.96
	Base	2/6/15	<1.60	<1.60	3.03	2.32	17.75	11.03
	Base/Low	4/7/15	4.65	4.13*	4.05	3.02	17.11	10.63
	Low	5/7/15	2.01	<1.60	3.48	2.63	12.37	7.68
	Low	6/9/15	1.74	1.66	4.02	3.00	16.52	10.26
	High	7/1/15	<1.60	<1.60	3.97	2.96	10.84	6.74
	High	7/10/15	1.61	<1.60	3.34	2.53	21.53	13.37

<sup>\*</sup> Dissolved copper concentrations exceed either the event-specific acute or chronic North Carolina Water Quality Standard

As mentioned at the beginning of Section 3.0, the method blank associated with the copper samples taken April 7, 2015 contained low levels of copper. We have assumed that this blank was contaminated in the lab, and that the samples were not compromised. This assumption leads to state water quality standards for copper for acute and chronic levels being exceeded by all three of the April 7<sup>th</sup> samples, and yet these samples do not exceed the BLM-derived CMC or CCC. If, however, we were to think the samples were somehow contaminated and results reflected artificially high copper levels, we could subtract out the blank level of dissolved copper (3.11 ug/L). This would reduce the sample results significantly (1.81, 1.06, and 1.03 ug/L for NC 50, SR 1555, and NC 210, respectively) and put the results below the state water quality standards. However, there were other samples containing elevated levels of copper, and the other eight of the total of nine batches of samples had clean blanks. Therefore, we believe these results are accurate and yet show copper to be at safe levels according to the BLM results.

Table 7 provides statistics for the water quality parameters.

<sup>\*\*</sup> Sample exceeds the BLM-derived event-specific CMC/CCC for copper.

Table 7. Statistics for water quality parameters collected in Swift Creek (n=24 for all parameters)

Parameter	Median	Maximum	Minimum	10 <sup>th</sup> percentile	90 <sup>th</sup> percentile
Temperature (°C)	20	29.8	5.2	5.74	27.4
pН	7.17	8.16	6.51	6.82	7.49
DOC (mg/L)	5.1	6.2	0.44	1.81	5.97
Ca (mg/L)	6.38	8.18	5.01	5.26	7.27
Mg (mg/L)	2.22	2.66	1.74	1.85	2.48
Na (mg/L)	7.46	8.62	4.29	4.95	8.39
K (mg/L)	2.5	3.77	2.08	2.17	3.20
SO <sub>4</sub> (mg/L)	3.85	4.9	3.2	3.7	4.47
Cl (mg/L)	7.25	11	4.9	5.23	9.58
CaCO <sub>3</sub> (mg/L)	25.5	35	19	20.3	30.7

A sensitivity analysis was performed, in which the median of each parameter was used in the BLM. Then each parameter was individually changed to the maximum and minimum values observed to see how each parameter altered the outcome (CMC and CCC values). The results of this analysis (Table 8) indicate that, as reported by Augspurger (2012), pH and dissolved organic carbon have the most influence on the results of the model.

Table 8. Results of sensitivity analysis of Swift Creek water quality data in the BLM analysis of water quality criteria for copper. Dissolved organic carbon and pH (shaded) are the parameters with the most influence on the model output.

_	CMC (ug/L)	CCC (ug/L)	% Deviation from Median CCC
All medians	12.7823	7.9393	
max T	13.1127	8.1445	2.6
min T	12.5694	7.8071	-1.7
max pH	42.5758	26.4446	233.1
min pH	4.0797	2.5339	-68.1
max DOC	15.6736	9.7352	22.6
min DOC	1.0844	0.6735	-91.5
max Ca	12.6425	7.8525	-1.1
min Ca	12.938	8.036	1.2
max Mg	12.7727	7.9334	-0.1
min Mg	12.795	7.9472	0.1
max Na	12.957	8.0478	1.4
min Na	12.2739	7.6235	-4.0
max K	12.7569	7.9235	-0.2
min K	12.7823	7.9393	0.0
max SO4	12.7569	7.9235	-0.2
min SO4	12.7918	7.9452	0.1
max Cl	12.7124	7.8959	-0.5
min Cl	12.8172	7.961	0.3
max Alk	12.6806	7.8762	-0.8
min Alk	12.8458	7.9788	0.5

#### 3.4.USGS and City of Raleigh Water Quality Monitoring

There are limited datasets available with which to compare the information generated in this study. The data that are available include City of Raleigh and USGS datasets that cover some of

these parameters to varying degrees. The most common parameters that are monitored regularly include temperature, pH, and ammonia. The City of Raleigh has been monitoring water quality conditions below Lake Benson since 2009, corresponding to the opening of the Dempsey E. Benton Water Treatment Plant. A USGS gauge located below Lake Benson monitored water quality from 1989 to 1995 and then again from 2005 to 2011 (Figure 1). Analysis of ammonia and copper was performed using the available data from these organizations (Appendix C).

The City of Raleigh monitoring program includes collections measuring temperature, pH, DO, conductivity, fecal coliform, turbidity, ammonia, total nitrogen, and total phosphorous. The City monitors these parameters at a number of locations, in coordination with other local non-profits, including five stations in the Lower SCW. Though this information is broken down by site, it is apparent that measurements are fairly consistent throughout the watershed. During monthly sampling beginning August 2009 and continuing through the present, no sample exceeded the event-specific acute or chronic criteria according to USEPA 2013 recommendations at stations J4500000, J4510000, J4511000, and J4520000 for ammonia. Sampling for station J4580000 took place between May 2012 and present, with no sample exceeding the event-specific acute or chronic criteria according to USEPA 2013 recommendations.

The USGS station (02087701) collected water quality data, including temperature, pH, DO, ammonia, hardness, and copper, among other parameters. Ammonia was measured approximately four times per year between April and November. During this period, two samples exceeded the event-specific chronic criteria, according to USEPA 2013 recommendations (on August 30, 2006 and August 20, 2009). The recommended acute criteria was not exceeded at this station during the sampling period. This gauge also collected some hardness and copper data. Copper was measured above the NCDWR recommended event-specific chronic standard thirteen times during the sampling period, and was measured above the event-specific acute standard seven times during the sampling period (Appendix C). When the BLM is used to derive acute and chronic water quality standards, however, there is only one day on which the chronic standard is exceeded (April 15, 2010, Table 9). Interestingly, station 02087701 is directly downstream of the Lake Benson dam and the Dempsey E. Benton WTP (Figure 1), though the WTP was constructed in 2010, so it does not explain all of the elevated copper levels in Swift Creek during this sampling period.

Table 9. USGS Gauge 02087701 BLM results

10/18/1989 6/20/1990 8/14/1990 9/5/1990 9/5/1990 10/24/1990 4/25/1991 6/11/1991 7/23/1991 8/6/1991 9/17/1991 4/16/1992 6/2/1992 8/13/1992 10/15/1992 4/26/1993 6/25/1993 8/4/1993 10/14/1993	0.96 2.88 2.88 5.76 2.88 1.92 2.88	5.6969 23.4103 82.864 37.8734 33.2663 9.157	3.5384 14.5406 51.4683 23.5239 20.6623
8/14/1990 9/5/1990 9/5/1990 10/24/1990 4/25/1991 6/11/1991 7/23/1991 8/6/1991 9/17/1991 4/16/1992 6/2/1992 8/13/1992 10/15/1992 4/26/1993 6/25/1993 8/4/1993	2.88 5.76 2.88 1.92	82.864 37.8734 33.2663	51.4683 23.5239
9/5/1990 9/5/1990 10/24/1990 4/25/1991 6/11/1991 7/23/1991 8/6/1991 9/17/1991 4/16/1992 6/2/1992 8/13/1992 10/15/1992 4/26/1993 6/25/1993 8/4/1993	5.76 2.88 1.92	37.8734 33.2663	23.5239
9/5/1990 10/24/1990 4/25/1991 6/11/1991 7/23/1991 8/6/1991 9/17/1991 4/16/1992 6/2/1992 8/13/1992 10/15/1992 4/26/1993 6/25/1993 8/4/1993	2.88 1.92	33.2663	
10/24/1990 4/25/1991 6/11/1991 7/23/1991 8/6/1991 9/17/1991 4/16/1992 6/2/1992 8/13/1992 10/15/1992 4/26/1993 6/25/1993 8/4/1993	1.92		20,6623
4/25/1991 6/11/1991 7/23/1991 8/6/1991 9/17/1991 4/16/1992 6/2/1992 8/13/1992 10/15/1992 4/26/1993 6/25/1993 8/4/1993		0.157	20.0023
6/11/1991 7/23/1991 8/6/1991 9/17/1991 4/16/1992 6/2/1992 8/13/1992 10/15/1992 4/26/1993 6/25/1993 8/4/1993	2.88	9.137	5.6876
7/23/1991 8/6/1991 9/17/1991 4/16/1992 6/2/1992 8/13/1992 10/15/1992 4/26/1993 6/25/1993 8/4/1993		7.1966	4.4699
8/6/1991 9/17/1991 4/16/1992 6/2/1992 8/13/1992 10/15/1992 4/26/1993 6/25/1993 8/4/1993	1.92	134.4316	83.4979
9/17/1991 4/16/1992 6/2/1992 8/13/1992 10/15/1992 4/26/1993 6/25/1993 8/4/1993	1.92	26.7688	16.6266
4/16/1992 6/2/1992 8/13/1992 10/15/1992 4/26/1993 6/25/1993 8/4/1993	3.84	20.0361	12.4448
6/2/1992 8/13/1992 10/15/1992 4/26/1993 6/25/1993 8/4/1993	2.88	14.606	9.0721
8/13/1992 10/15/1992 4/26/1993 6/25/1993 8/4/1993	4.8	22.8607	14.1992
10/15/1992 4/26/1993 6/25/1993 8/4/1993	0.96	15.1239	9.3938
4/26/1993 6/25/1993 8/4/1993	1.92	15.2669	9.4826
6/25/1993 8/4/1993	0.96	30.4576	18.9178
8/4/1993	1.92	49.5023	30.7468
	1.92	8.0672	5.0107
10/14/1993	0.96	15.788	9.8062
	0.96	12.9189	8.0242
11/15/1993	0.96	15.7785	9.8003
4/22/1994	1.92	13.6179	8.4583
6/21/1994	1.92	19.6611	12.2119
8/2/1994	1.92	10.1102	6.2796
12/6/1994	3.84	12.5599	7.8012
5/1/1995	1.92	19.1845	11.9159
6/16/1995	1.92	8.9187	5.5396
10/19/2005	0.768	18.8636	11.7165
4/20/2006	1.248	7.7272	4.7995
10/15/2009	2.592	9.2269	5.731
4/15/2010	8.352*	10.2277	6.3526
10/14/2010	1.728	15.5847	9.6799
4/25/2011		11.0157	6.842

<sup>\*</sup> Denotes copper exceeding BLM-derived chronic standard.

#### 4.0 CONCLUSION

Both ammonia and copper have been detected in Swift Creek during the sampling period from November 2014 to July 2015. These parameters have been identified as the most significant toxicants to freshwater mussels (USEPA 2008), and the detection of them is cause for concern if detected at concentrations in excess of those thought to be safe for mussels. Whether or not the

levels of ammonia and copper are high enough to be detrimental to mussels is still in question. To fully answer the question of whether water quality conditions in Swift Creek are harmful to DWM, long-term toxicity analysis on DWM analyzing growth, survival, and reproduction is needed. In the absence of that data, similar analysis on other species of the same genus and/or associate species could be done instead. Such analysis is outside the scope of this report.

Considering that mussels still exist in Swift Creek suggests that they are not severely impacted by water quality conditions. Population trend analysis, however, suggests that the overall mussel fauna has been in a slow decline since the early 1990's when periodic monitoring began. This decline coincides with land use changes during this period in the SCW, most notably with increases in residential and commercial development (Catena 2014).

Copper concentrations in Swift Creek appear to be mostly dependent on organic carbon and pH. Since the potential for toxicity can be determined by measuring only a few additional water quality parameters, monitoring could continue at less cost into the future to examine how mussel populations respond to changing water quality conditions. Studying the watershed for less than a year cannot provide a full assessment of the relationship between water quality and mussel populations. Long-term monitoring is needed to get a clearer picture of this relationship.

Ammonia concentrations do not appear to be of concern in Swift Creek, with some elevated concentrations limited to directly below Lake Benson. The long-term monitoring of Swift Creek by the USGS has demonstrated that event-specific criteria for ammonia are rarely exceeded. Monitoring efforts, however, could be improved to fill in gaps and better understand how to best reduce ammonia contamination.

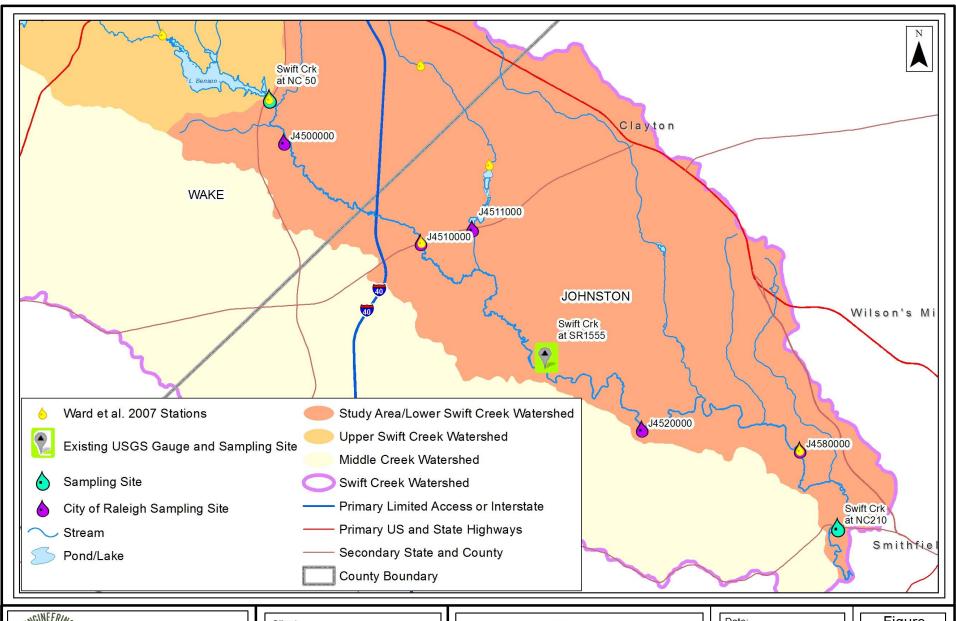
Other pollutants that were measured, including some heavy metals, did not appear to be at toxic levels to aquatic organisms. As has been discussed, metal toxicity is more complex than just a simple measurement of water conditions at a single sampling. Future analysis may be possible, particularly with the use of the BLM, to determine toxicity to freshwater mussels and other aquatic organisms.

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Dwarf Wedgemussel Viability Study: Phase 2

Water Quality Monitoring Stations Lower Swift Creek Watershed

Wake & Johnston Counties, North Carolina

Date:							
August 2015							
Scale:							
0	0.5	1 Miles					
	Ĺ						
Job No.:							
	117	5					

Figure 1

### Appendix A – 2014-2015 Water Quality Laboratory Results

NC 50 (Benson Road) be	low Lake Benso	on in Garner						
Flow:	Baseflow (30 cfs)	High (50 cfs)	Baseflow (100 cfs)	Baseflow (47 cfs)	Low Flow (39 cfs)	Low Flow (11cfs)	High Flow (53 cfs)	High Flow (127 cfs)
Date of Sampling	11/4/2014	11/19/2014	2/6/2015	4/7/2015	5/7/2015	6/9/2015	7/1/2015	7/10/2015
<u>Analyte</u>	Result	Result	Result	Result	Result	Result	Result	Result
Cadmium (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND
Calcium (mg/L)	5.54	6.01	5.01	7	6.31	8.18	7.47	7.37
Copper (total, ug/L)	1.98	ND	2.46	5.91	2.03	5.53	ND	ND
Lead (ug/L)	ND	ND	ND	ND	ND	ND	ND	ND
Magnesium (mg/L)	1.74	1.91	1.74	2.29	1.97	2.4	2.4	2.37
Nickel (ug/L)	ND	ND	ND	ND	ND	ND	ND	ND
Potassium (mg/L)	3.25	3.25	2.42	2.57	2.5	2.99	2.72	2.48
Sodium (mg/L)	4.35	4.76	4.29	8.62	7.01	8.24	7.8	7.76
Zinc (ug/L)	6.33	6.14	ND	ND	ND	16.7	4.09	ND
Ammonia (mg/L)	0.063	0.25	ND	ND	0.051	0.072	ND	0.069
Chloride (mg/L)	5	7.2	4.9	11	8.8	9.9	9.7	9.3
Sulfate (mg/L)	3.8	3.7	4.5	4.9	4.2	4.1	4.1	4
Total Alkalinity (mg/L)	26	26	20	29	19	30	27	23
Total Organic Carbon (mg/L)	6.2	0.79	5.1	6.1	6	5.9	5.9	5.9
Dissolved Copper (ug/L)	ND	1.96	2.24	4.92	1.75	2.79	ND	ND
Temperature (°C)	14.8	9.1	6.6	18.4	22.5	25.7	29.7	29.8
DO (%)	102.2	96.3	110	106.4	66	52.1	89.2	68.8
DO (mg/L)	10.2	11.29	13.25	9.9	5.72	4.16	6.82	5.25
Conductivity (us/cm)	71.5	73.7	65.1	93.2	90.9	103.8	9.99	96.8
рН	6.51	7.22	7.15	7.32	6.86	7.01	7.42	7.17

SR 1555 (Barber Mill Rd)	in Clayton							
Flow:	High (50 cfs)	Baseflow (38 cfs)	Baseflow (100 cfs)	Baseflow (47 cfs)	Low flow (39 cfs)	Low Flow (11cfs)	High Flow (53 cfs)	High Flow (127 cfs)
Date of Sampling	11/19/2014	12/16/2014	2/6/2015	4/7/2015	5/7/2015	6/9/2015	7/1/201	7/10/201
<u>Analyte</u>	Result	Result	Result	Result	Result	Result	Result	Result
Cadmium (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND
Calcium (mg/L)	6.16	5.94	5.17	6.55	5.46	6.87	6.89	6.02
Copper (total, ug/L)	ND	ND	2.75	4.13	ND	1.69	ND	ND
Lead (ug/L)	ND	ND	ND	ND	ND	ND	ND	ND
Magnesium (mg/L)	2.2	2.03	1.82	2.23	2.03	2.18	2.35	2.13
Nickel (ug/L)	ND	ND	ND	ND	ND	2.02	ND	ND
Potassium (mg/L)	3.77	2.88	2.19	2.33	2.16	2.08	2.55	2.4
Sodium (mg/L)	7.79	6.91	5.5	8.04	7.5	8.52	7.55	7.34
Zinc (ug/L)	ND	ND	ND	ND	ND	ND	ND	ND
Ammonia (mg/L)	0.35	ND	ND	ND	0.078	ND	0.073	0.06
Chloride (mg/L)	5.2	6.1	5.3	8.3	7.3	7.2	8.5	8
Sulfate (mg/L)	3.7	4	4.4	4	3.8	3.2	3.8	3.8
Total Alkalinity (mg/L)	26	20	22	30	21	32	29	22
Total Organic Carbon (mg/L)	0.46	4.2	4.3	4.8	4.9	4.2	5.3	5.2
Dissolved Copper (ug/L)	ND	ND	ND	4.17	ND	ND	ND	ND
Temperature (°C)	5.9		5.2	17.7	21	24	26.2	27.7
DO (%)	95.7		106.7	96.8	89.6	92.6	84.4	73.2
DO (mg/L)	11.87		13.35	9.2	8	7.8	6.74	5.77
Conductivity (us/cm)	92.1		70.2	78.4	84.9	90.5	96.1	84.5
pН	7.23		7.28	7.23	6.81	7.05	7.14	7.02

Flow:	Baseflow (30	High (50	Baseflow	Baseflow (47	Low Flow (39	Low Flow	High	High
	cfs)	cfs)	(100 cfs)	cfs)	cfs)	(11cfs)	Flow	Flow
							(53 cfs)	(127 cfs)
Date of Sampling	11/4/2014	11/19/2014	2/6/2015	4/7/2015	5/7/2015	6/9/2015	7/1/2015	7/10/2015
<u>Analyte</u>	Result	Result	Result	Result	Result	Result	Result	Result
Cadmium (mg/L)	ND	ND	ND	ND	ND	0.36	ND	ND
Calcium (mg/L)	6.44	6.46	5.05	6.85	5.79	7.03	7	5.59
Copper (total, ug/L)	ND	ND	ND	4.65	2.01	1.74	ND	1.61
Lead (ug/L)	ND	ND	ND	ND	ND	ND	ND	ND
Magnesium (mg/L)	2.48	2.47	1.95	2.66	2.27	2.49	2.42	2.15
Nickel (ug/L)	ND	ND	ND	ND	ND	ND	ND	ND
Potassium (mg/L)	2.86	3.08	2.11	2.46	2.36	2.31	2.65	2.5
Sodium (mg/L)	6.95	7.42	5.39	8.46	7.07	8.03	7.64	6.62
Zinc (ug/L)	3.8	ND	ND	ND	ND	ND	ND	ND
Ammonia (mg/L)	ND	0.58	ND	ND	0.06	ND	ND	ND
Chloride (mg/L)	6.7	7.2	6	8.5	7.1	7.5	8.5	7
Sulfate (mg/L)	3.7	3.7	4.6	4.2	3.8	3.3	3.9	3.7
Total Alkalinity (mg/L)	31	35	22	26	25	23	23	22
Total Organic Carbon	4.8	0.44	4.4	5.1	5.3	4.3	5.7	5.3
(mg/L)	MD	ND	ND	4.12	ND	1.66	ND.	ND
Dissolved Copper (ug/L)	ND	ND	ND	4.13	ND	1.66	ND	ND
Temperature (°C)	10	5.7	5.2	17.6	20	23.6	25.5	26.1
DO (%)	99.4	102.6	104.1	93.35	84.9	73.5	85.7	75.2
DO (mg/L)	11.18	12.8	13.08	8.72	7.6	6.16	6.9	6.16
Conductivity (us/cm)	92.1	94.8	72.8	86.6	87.5	96.2	94.9	80
pН	6.56	8.16	7.56	7.38	7.12	7.47	6.98	7.5

## **Appendix B – ENCO Laboratory Reports**

102-A Woodwinds Industrial Court Cary NC, 27511

Phone: 919.467.3090 FAX: 919.467.3515

Thursday, November 20, 2014 The Catena Group (TH015) Attn: Nancy Scott 410-B Millstone Drive Hillsborough, NC 27278

RE: Laboratory Results for

Project Number: [none], Project Name/Desc: Swift Creek Water Quality

ENCO Workorder(s): C414241

Dear Nancy Scott,

Enclosed is a copy of your laboratory report for test samples received by our laboratory on Tuesday, November 4, 2014.

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. Results for these procedures apply only to the samples as submitted.

The analytical results contained in this report are in compliance with NELAC standards, except as noted in the project narrative. This report shall not be reproduced except in full, without the written approval of the Laboratory.

This report contains only those analyses performed by Environmental Conservation Laboratories. Unless otherwise noted, all analyses were performed at ENCO Cary. Data from outside organizations will be reported under separate cover.

If you have any questions or require further information, please do not hesitate to contact me.

Sill Scatt

Sincerely,

Bill Scott

Project Manager

Enclosure(s)



#### SAMPLE SUMMARY/LABORATORY CHRONICLE

Client ID: Swift Creek 210		Lab ID:	C414241-01	Sampled:	11/04/14	14:05	Received:	11/04/14	14:48
<u>Parameter</u>	Hold Date/Time(s)		Prep Da	nte/Time(s)		Analysis Date/	Time(s)		
EPA 300.0	12/02/14		11/06/1	4 07:22		11/06/14 14:51			
EPA 350.1	12/02/14		11/07/1	4 08:56		11/07/14 13:24			
EPA 6010C	05/03/15		11/11/1	4 14:04		11/13/14 10:33			
SM 5310B-2000	12/02/14		11/12/1	1 08:06		11/12/14 15:00			
Client ID: Swift Creek 210		Lab ID:	C414241-01RE1	Sampled:	11/04/14	14:05	Received:	11/04/14	14:48
<u>Parameter</u>	Hold Date/Time(s)		Prep Da	nte/Time(s)		Analysis Date/	Time(s)		
EPA 310.2	11/18/14		11/05/1	1 09:04		11/05/14 13:23			
Client ID: Swift Creek 50		Lab ID:	C414241-02	Sampled:	11/04/14	13:05	Received:	11/04/14	14:48
<u>Parameter</u>	Hold Date/Time(s)		Prep Da	nte/Time(s)		Analysis Date/	Time(s)		
EPA 300.0	12/02/14		11/06/1	4 07:22		11/06/14 15:59			
EPA 350.1	12/02/14		11/07/1	4 08:56		11/07/14 13:26			
EPA 6010C	05/03/15		11/11/1	4 14:04		11/13/14 10:35			
SM 5310B-2000	12/02/14		11/12/1	1 08:06		11/12/14 15:00			
Client ID: Swift Creek 50		Lab ID:	C414241-02RE1	Sampled:	11/04/14	13:05	Received:	11/04/14	14:48
<u>Parameter</u>	Hold Date/Time(s)		Prep Da	nte/Time(s)		Analysis Date/	Time(s)		
EPA 310.2	11/18/14		11/05/1	4 09:04		11/05/14 13:24			
Client ID: Swift Creek 210 Di	ssolved	Lab ID:	C414241-03	Sampled:	11/04/14	14:05	Received:	11/04/14	14:48
<u>Parameter</u>	Hold Date/Time(s)		Prep Da	nte/Time(s)		Analysis Date/	Time(s)		
EPA 6010C	05/03/15		11/11/1	14:04		11/13/14 10:38			
Client ID: Swift Creek 50 Diss	solved	Lab ID:	C414241-04	Sampled:	11/04/14	13:05	Received:	11/04/14	14:48
<u>Parameter</u>	Hold Date/Time(s)		Prep Da	nte/Time(s)		Analysis Date/	Time(s)		
EPA 6010C	05/03/15		11/11/1	14:04		11/13/14 10:40			



#### **SAMPLE DETECTION SUMMARY**

Client ID: Swift Creek 210			Lab ID:	C414241-01			
<u>Analyte</u>	<u>Results</u>	<u>Flag</u>	<u>MDL</u>	<u>PQL</u>	<u>Units</u>	<u>Method</u>	<u>Notes</u>
Calcium - Total	6440		39.0	100	ug/L	EPA 6010C	R-05
Chloride	6.7		2.2	5.0	mg/L	EPA 300.0	
Magnesium - Total	2480		23.0	100	ug/L	EPA 6010C	R-05
Potassium - Total	2860		150	500	ug/L	EPA 6010C	R-05
Sodium - Total	6950		400	500	ug/L	EPA 6010C	R-05
Sulfate as SO4	3.7	J	2.9	5.0	mg/L	EPA 300.0	
Total Organic Carbon - Dissolved	4.8		0.32	1.0	mg/L	SM 5310B-2000	
Zinc - Total	3.80	JB	3.80	10.0	ug/L	EPA 6010C	J-01, R-05
Client ID: Swift Creek 210			Lab ID:	C414241-01RE1			
<u>Analyte</u>	<u>Results</u>	<u>Flag</u>	<u>MDL</u>	<u>PQL</u>	<u>Units</u>	<u>Method</u>	<u>Notes</u>
Total Alkalinity as CaCO3	31		14	15	mg/L	EPA 310.2	
Client ID: Swift Creek 50			Lab ID:	C414241-02			
<u>Analyte</u>	<u>Results</u>	<u>Flag</u>	<u>MDL</u>	<u>PQL</u>	<u>Units</u>	<u>Method</u>	<u>Notes</u>
Ammonia as N	0.063	J	0.045	0.10	mg/L	EPA 350.1	
Calcium - Total	5540		39.0	100	ug/L	EPA 6010C	
Chloride	5.0		2.2	5.0	mg/L	EPA 300.0	
Copper - Total	1.98	J	1.60	10.0	ug/L	EPA 6010C	
Magnesium - Total	1740		23.0	100	ug/L	EPA 6010C	
Potassium - Total	3250		150	500	ug/L	EPA 6010C	
Sodium - Total	4350		400	500	ug/L	EPA 6010C	
Sulfate as SO4	3.8	J	2.9	5.0	mg/L	EPA 300.0	
Total Organic Carbon - Dissolved	6.2		0.32	1.0	mg/L	SM 5310B-2000	
Zinc - Total	6.33	JB	3.80	10.0	ug/L	EPA 6010C	J-01
Client ID: Swift Creek 50			Lab ID:	C414241-02RE1			
<u>Analyte</u>	<u>Results</u>	<u>Flag</u>	<u>MDL</u>	<u>PQL</u>	<u>Units</u>	<u>Method</u>	<u>Notes</u>



Work Order: C414241

#### **ANALYTICAL RESULTS**

**Description:** Swift Creek 210 **Lab Sample ID:** C414241-01 **Received:** 11/04/14 14:48

**Matrix:** Water **Sampled:** 11/04/14 14:05

**Project:** Swift Creek Water Quality Sampled By: Nancy Scott

#### Metals (total recoverable) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<b>Analyzed</b>	By	<u>Notes</u>
Cadmium [7440-43-9]^	ND		ug/L	1	0.360	1.00	4K11023	EPA 6010C	11/13/14 10:33	JDH	R-05
Calcium [7440-70-2]^	6440		ug/L	1	39.0	100	4K11023	EPA 6010C	11/13/14 10:33	JDH	R-05
Copper [7440-50-8]^	ND		ug/L	1	1.60	10.0	4K11023	EPA 6010C	11/13/14 10:33	JDH	R-05
Lead [7439-92-1]^	ND		ug/L	1	2.10	10.0	4K11023	EPA 6010C	11/13/14 10:33	JDH	R-05
Magnesium [7439-95-4]^	2480		ug/L	1	23.0	100	4K11023	EPA 6010C	11/13/14 10:33	JDH	R-05
Nickel [7440-02-0]^	ND		ug/L	1	1.80	10.0	4K11023	EPA 6010C	11/13/14 10:33	JDH	R-05
Potassium [7440-09-7]^	2860		ug/L	1	150	500	4K11023	EPA 6010C	11/13/14 10:33	JDH	R-05
Sodium [7440-23-5]^	6950		ug/L	1	400	500	4K11023	EPA 6010C	11/13/14 10:33	JDH	R-05
Zinc [7440-66-6]^	3.80	JB	ug/L	1	3.80	10.0	4K11023	EPA 6010C	11/13/14 10:33	JDH	J-01, R-05

#### **Classical Chemistry Parameters**

^ - ENCO Cary certified analyte [NC 591]

zivee early certified analyte [ive esti]											
Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<b>Analyzed</b>	By	<u>Notes</u>
Ammonia as N [7664-41-7]^	ND		mg/L	1	0.045	0.10	4K07017	EPA 350.1	11/07/14 13:24	SHA	
Chloride [16887-00-6]^	6.7		mg/L	1	2.2	5.0	4K06002	EPA 300.0	11/06/14 14:51	CV	
Sulfate as SO4 [14808-79-8]^	3.7	J	mg/L	1	2.9	5.0	4K06002	EPA 300.0	11/06/14 14:51	CV	
Total Alkalinity as CaCO3 [471-34-1]^	31		mg/L	1	14	15	4K05003	EPA 310.2	11/05/14 13:23	SHA	

#### Classical Chemistry Parameters (Dissolved)

^ - ENCO Orlando certified analyte [NC 424]

Analyte [CAS Number]	Results	<u>Flag</u>	<u>Units</u>	<u>DF</u>	MDL	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Total Organic Carbon^	4.8		mg/L	1	0.32	1.0	4K12005	SM 5310B-2000	11/12/14 15:00	RSA	



#### **ANALYTICAL RESULTS**

**Description:** Swift Creek 50 **Lab Sample ID:** C414241-02 **Received:** 11/04/14 14:48

**Matrix:** Water **Sampled:** 11/04/14 13:05 **Work Order:** C414241

**Project:** Swift Creek Water Quality Sampled By: Nancy Scott

#### Metals (total recoverable) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Cadmium [7440-43-9]^	ND		ug/L	1	0.360	1.00	4K11023	EPA 6010C	11/13/14 10:35	JDH	
Calcium [7440-70-2]^	5540		ug/L	1	39.0	100	4K11023	EPA 6010C	11/13/14 10:35	JDH	
Copper [7440-50-8]^	1.98	J	ug/L	1	1.60	10.0	4K11023	EPA 6010C	11/13/14 10:35	JDH	
Lead [7439-92-1]^	ND		ug/L	1	2.10	10.0	4K11023	EPA 6010C	11/13/14 10:35	JDH	
Magnesium [7439-95-4]^	1740		ug/L	1	23.0	100	4K11023	EPA 6010C	11/13/14 10:35	JDH	
Nickel [7440-02-0]^	ND		ug/L	1	1.80	10.0	4K11023	EPA 6010C	11/13/14 10:35	JDH	
Potassium [7440-09-7]^	3250		ug/L	1	150	500	4K11023	EPA 6010C	11/13/14 10:35	JDH	
Sodium [7440-23-5]^	4350		ug/L	1	400	500	4K11023	EPA 6010C	11/13/14 10:35	JDH	
Zinc [7440-66-6]^	6.33	JB	ug/L	1	3.80	10.0	4K11023	EPA 6010C	11/13/14 10:35	JDH	J-01

#### **Classical Chemistry Parameters**

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	MDL	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<b>Analyzed</b>	<u>By</u>	<u>Notes</u>
Ammonia as N [7664-41-7]^	0.063	J	mg/L	1	0.045	0.10	4K07017	EPA 350.1	11/07/14 13:26	SHA	
Chloride [16887-00-6]^	5.0		mg/L	1	2.2	5.0	4K06002	EPA 300.0	11/06/14 15:59	CV	
Sulfate as SO4 [14808-79-8]^	3.8	J	mg/L	1	2.9	5.0	4K06002	EPA 300.0	11/06/14 15:59	CV	
Total Alkalinity as CaCO3 [471-34-1]^	26		mg/L	1	14	15	4K05003	EPA 310.2	11/05/14 13:24	SHA	

#### **Classical Chemistry Parameters (Dissolved)**

^ - ENCO Orlando certified analyte [NC 424]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<b>Analyzed</b>	By	<u>Notes</u>
Total Organic Carbon^	6.2		ma/l	1	0.32	1.0	4K12005	SM 5310B-2000	11/12/14 15:00	RSA	

**Description:** Swift Creek 210 Dissolved **Lab Sample ID:** C414241-03 **Received:** 11/04/14 14:48

 Matrix:
 Water
 Sampled: 11/04/14 14:05
 Work Order: C414241

Project: Swift Creek Water Quality Sampled By: Nancy Scott

#### Metals (Dissolved) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	MDL	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Copper [7440-50-8]^	ND		ug/L	1	1.60	10.0	4K11023	EPA 6010C	11/13/14 10:38	JDH	

**Description:** Swift Creek 50 Dissolved **Lab Sample ID:** C414241-04 **Received:** 11/04/14 14:48

 Matrix:
 Water
 Sampled: 11/04/14 13:05
 Work Order: C414241

**Project:** Swift Creek Water Quality Sampled By: Nancy Scott

#### Metals (Dissolved) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Copper [7440-50-8]^	ND		ug/L	1	1.60	10.0	4K11023	EPA 6010C	11/13/14 10:40	JDH	



#### Metals (total recoverable) by EPA 6000/7000 Series Methods - Quality Control

#### Batch 4K11023 - EPA 3005A

LCS (4K11023-BS1)

Blank (4K11023-BLK1) Prepared: 11/11/2014 14:04 Analyzed: 11/13/2014 09:48

Analyte	Result	<u>Flaq</u>	<u>POL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Cadmium	0.360	U	1.00	ug/L							
Calcium	39.0	U	100	ug/L							
Copper	1.60	U	10.0	ug/L							
Lead	2.10	U	10.0	ug/L							
Magnesium	23.0	U	100	ug/L							
Nickel	9.60	J	10.0	ug/L							
Potassium	150	U	500	ug/L							
Sodium	400	U	500	ug/L							
Zinc	4.00	J	10.0	ug/L							

					Spike	Source		%REC		RPD	
<u>Analyte</u>	Result	Flag	POL	<u>Units</u>	Level	Result	%REC	<u>Limits</u>	RPD	<u>Limit</u>	<u>Notes</u>
Cadmium	21.2		1.00	ug/L	20.0		106	80-120			
Calcium	2140		100	ug/L	2000		107	80-120			
Copper	201		10.0	ug/L	200		101	80-120			
	240		400	,,	200		405	00 400			

Prepared: 11/11/2014 14:04 Analyzed: 11/13/2014 09:54

210 10.0 ug/L 200 105 80-120 Lead 2000 80-120 Magnesium 2090 100 ug/L 105 Nickel 213 В 10.0 ug/L 200 106 80-120 Potassium 10600 500 ug/L 10000 106 80-120 Sodium 10600 500 ug/L 10000 106 80-120 Zinc 218 В 10.0 ug/L 200 80-120

Matrix Spike (4K11023-MS1) Prepared: 11/11/2014 14:04 Analyzed: 11/13/2014 10:00

Source: C414425-01 Spike %REC RPD Source **Analyte** Result Flag POL Units Level %REC **Limits RPD** <u>Limit</u> Notes Result 75-125 Cadmium 20.8 1.00 ug/L 20.0 0.360 U 104 Calcium 9870 100 ug/L 2000 7880 100 75-125 10.0 ug/L 200 1.60 U 99 75-125 Copper 199 Lead 208 10.0 ug/L 200 2.10 U 104 75-125 Magnesium 4720 100 ug/L 2000 2690 102 75-125 Nickel 10.0 200 1.80 U 105 75-125 211 В ug/L Potassium 14200 500 ug/L 10000 3590 106 75-125 Sodium 36500 500 ug/L 10000 26000 105 75-125

ug/L

200

3.80 U

108

75-125

Matrix Spike Dup (4K11023-MSD1) Prepared: 11/11/2014 14:04 Analyzed: 11/13/2014 10:02

10.0

217

В

Source: C414425-01

Zinc

<u>Analyte</u>	<u>Result</u>	Flag	POL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Cadmium	20.8		1.00	ug/L	20.0	0.360 U	104	75-125	0.07	20	
Calcium	9340		100	ug/L	2000	7880	73	75-125	6	20	QM-05
Copper	201		10.0	ug/L	200	1.60 U	100	75-125	1	20	
Lead	207		10.0	ug/L	200	2.10 U	104	75-125	0.4	20	
Magnesium	4520		100	ug/L	2000	2690	92	75-125	4	20	
Nickel	210	В	10.0	ug/L	200	1.80 U	105	75-125	0.2	20	
Potassium	13600		500	ug/L	10000	3590	100	75-125	4	20	
Sodium	34500		500	ug/L	10000	26000	85	75-125	6	20	
Zinc	217	В	10.0	ug/L	200	3.80 U	108	75-125	0.04	20	



#### Metals (total recoverable) by EPA 6000/7000 Series Methods - Quality Control

Datak	4V11022	EPA 3005A -	Cambinus
Batcn	4K11U23 -	EPA 3UUSA -	Continuea

Post Spike (4K11023-PS1)			Prepar	Prepared: 11/11/2014 14:04 Analyzed: 11/13/2014 10:05								
Source: C414425-01												
<u>Analyte</u>	Result	<u>Flaq</u>	<u>POL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes	
Cadmium	0.0194		0.00100	mg/L	0.0200	0.000144	96	80-120				
Calcium	9.18		0.100	mg/L	2.00	7.88	65	80-120			QM-08	
Copper	0.183		0.0100	mg/L	0.200	0.000187	92	80-120				
Lead	0.193		0.0100	mg/L	0.200	-0.000900	96	80-120				
Magnesium	4.50		0.100	mg/L	2.00	2.69	91	80-120				
Nickel	0.199	В	0.0100	mg/L	0.200	-0.000247	99	80-120				
Potassium	12.7		0.500	mg/L	10.0	3.59	91	80-120				
Sodium	33.6		0.500	mg/L	10.0	26.0	76	80-120			QM-08	
Zinc	0.203	В	0.0100	mg/L	0.200	0.00329	100	80-120				

#### Batch 4K11023 - EPA 3005A

Blank (4K11023-BLK1)					Prepar	ed: 11/11/2014	1 14:04 Anal	lyzed: 11/13/	2014 09:48		
<u>Analyte</u>	<u>Result</u>	<u>Flaq</u>	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	<u>Not</u>
Copper Blank (4K11023-BLK2)	1.60	U	10.0	ug/L	Duanau	ed: 11/11/2014	1 14.04 Appl	h.mad. 11/12/	2014 00.52		
Blank (4K11U23-BLK2)					Ргераг	ea: 11/11/2014	† 14:04 Anai	iyzea: 11/13/	2014 09:52		
<u>Analyte</u>	<u>Result</u>	<u>Flaq</u>	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Note
Copper	1.60	U	10.0	ug/L	_						
LCS (4K11023-BS1)					Prepar	ed: 11/11/2014	1 14:04 Anal	lyzed: 11/13/	2014 09:54		
Analyte	<u>Result</u>	Flag	<u>POL</u>	<u>Units</u>	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Note
Copper	201		10.0	ug/L	200		101	80-120			
Matrix Spike (4K11023-MS1)	)				Prepar	ed: 11/11/2014	1 14:04 Anal	lyzed: 11/13/	2014 10:00		
Source: C414425-01											
Analyte	Result	Flag	PQL	<u>Units</u>	Spike Level	Source Result	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Note
Copper	199		10.0	ug/L	200	1.60 U	99	75-125			
Matrix Spike Dup (4K11023-	MSD1)				Prepar	ed: 11/11/2014	1 14:04 Anal	lyzed: 11/13/	2014 10:02		
Source: C414425-01					Spike	Source		%REC		RPD	
Analyte	Result	Flag	<u>PQL</u>	<u>Units</u>	Level	Result	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Note
Copper	201		10.0	ug/L	200	1.60 U	100	75-125	1	20	
Post Spike (4K11023-PS1)					Prepar	ed: 11/11/2014	1 14:04 Anal	lyzed: 11/13/	2014 10:05		
Source: C414425-01					Spike	Source		%REC		RPD	
Australia	Result	Flag	POL	<u>Units</u>	Level	<u>Result</u>	%REC	Limits	RPD	<u>Limit</u>	Note
Analyte											

Batch 4K05003 - NO PREP



Batch 4K05003 - NO PREP - 0	Continued										
Blank (4K05003-BLK1)					Prepare	ed: 11/05/201	4 09:04 Anal	yzed: 11/05/	2014 12:09		
					Spike	Source		%REC		RPD	
<u>nalyte</u>	Result	Flag	POL	<u>Units</u>	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	No
tal Alkalinity as CaCO3	14	U	15	mg/L							
LCS (4K05003-BS1)					Prepare	ed: 11/05/201	4 09:04 Anal	yzed: 11/05/2	2014 12:10		
nalyte	Result	Flag	<u>POL</u>	<u>Units</u>	Spike Level	Source Result	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	No
tal Alkalinity as CaCO3	100		15	mg/L	100	Result	103	80-120	2	<u></u>	
Matrix Spike (4K05003-MS1)				9/ =		ed: 11/05/201			2014 12:12		
Source: C413508-04								,			
luk-	Danult	Floor	DOL	Haita	Spike	Source	0/ 856	%REC	DDD	RPD	
nalyte	Result 680	Flag	<b>PQL</b> 75	Units mg/l	Level 200	<u>Result</u> 490	<b>%REC</b> 99	<u>Limits</u> 80-120	RPD	<u>Limit</u>	<u>Nc</u>
tal Alkalinity as CaCO3			/5	mg/L		ed: 11/05/201			2014 12:14		
Matrix Spike Dup (4K05003-MS	D1)				Prepare	eu: 11/05/201	4 09:04 Anai	yzeu: 11/05/.	2014 12:14		
Source: C413508-04	Dogult	Fl	DOL	lluite.	Spike	Source	0/ 850	%REC		RPD	
nalyte ral Alkalinity as CaCO3	<u>Result</u> 650	<u>Flaq</u>	<b>POL</b> 75	<u>Units</u>	Level 200	Result 490	<b>%REC</b> 82	<u>Limits</u> 80-120	<b>RPD</b> 5	<u>Limit</u> 25	<u>N</u>
Batch 4K06002 - NO PREP	650		75	mg/L	200	490	02	00-120	5	25	
Batch 4R00002 - NO PREP											
Blank (4K06002-BLK1)					Prepare	ed: 11/06/201	4 07:22 Anal	yzed: 11/06/2	2014 08:36		
nalyte	Result	Flag	<u>POL</u>	<u>Units</u>	Spike Level	Source	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	No
loride	2.2	U	5.0	mg/L	Level	Result	70KLC	Lillies	KFD	Lillie	140
Ifate as SO4	2.9	U	5.0	mg/L							
LCS (4K06002-BS1)				-	Prepare	ed: 11/06/201	4 07:22 Anal	yzed: 11/06/2	2014 09:10		
					Spike	Source		%REC		RPD	
nalyte	Result	Flag	PQL	Units	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	No
oride fate as SO4	48		5.0 5.0	mg/L	50.0 50.0		96 93	90-110 90-110			
Matrix Spike (4K06002-MS1)	47		5.0	mg/L		ed: 11/06/201			2014 11:27		
Source: C413477-02					гтерате	eu. 11/00/201	+ 07.22 Andi	yzeu. 11/00/.	2014 11.27		
	Result	<u>Flag</u>	<u>PQL</u>	<u>Units</u>	Spike Level	Source Result	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	<u>No</u>
nalyte			5.0	mg/L	20.0	12	95	90-110			
	30										
loride			5.0	mg/L	20.0	13	90	90-110			
oride	30 31			mg/L		13 ed: 11/06/201			2014 12:18		
loride fate as SO4	30 31			mg/L					2014 12:18		
Source: C413477-02	30 31 <b>D1)</b>	Flag	5.0		Prepare <b>Spike</b>	ed: 11/06/201	4 07:22 Anal	yzed: 11/06/.		RPD Limit	Ne
loride Ifate as SO4 Matrix Spike Dup (4K06002-MS)	30 31	Flag		mg/L <u>Units</u> mg/L	Prepare	ed: 11/06/201		yzed: 11/06/2	2014 12:18  RPD  1	RPD Limit 10	<u>No</u>



Batch 4K07017 - NO PREP	- Continued										
Blank (4K07017-BLK1)					Prepare	ed: 11/07/201	4 08:56 Anal	yzed: 11/07/2	2014 12:26		
<u>nalyte</u>	Result	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	<u>Not</u>
nmonia as N	0.045	U	0.10	mg/L							
LCS (4K07017-BS1)					Prepare	ed: 11/07/201	4 08:56 Anal	yzed: 11/07/2	2014 12:32		
.nalyte	Result	Flag	<u>POL</u>	Units	Spike Level	Source	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Not
mmonia as N	1.0	1144	0.10	mg/L	0.997	<u>Result</u>	101	90-110	KFD	Lillie	1100
Matrix Spike (4K07017-MS1)			0.20	9/ =		ed: 11/07/201			2014 12:36		
Source: C411942-01					Пораго	00. 11,07,201		,200. 12,07,1	01 1 12.00		
nalyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	<u>Not</u>
mmonia as N	11		1.0	mg/L	3.98	6.6	100	90-110			
Matrix Spike Dup (4K07017-N	MSD1)				Prepare	ed: 11/07/201	4 08:56 Anal	yzed: 11/07/2	2014 12:38		
Source: C411942-01											
nalyte	Result	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source Result	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Not
						· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·		10	
	11 <b>(Dissolved) -</b>	Quality (	1.0 Control	mg/L	3.98	6.6	100	90-110	0.2	10	
mmonia as N  assical Chemistry Parameters  Batch 4K12005 - NO PREP  Blank (4K12005-BLK1)		Quality (		mg/L		6.6 ed: 11/12/201				10	
assical Chemistry Parameters  Batch 4K12005 - NO PREP		Quality (		mg/L						RPD	
assical Chemistry Parameters  Batch 4K12005 - NO PREP  Blank (4K12005-BLK1)		Quality (		mg/L Units	Prepare	ed: 11/12/201 <sup>,</sup>		yzed: 11/12/2			Not
assical Chemistry Parameters  Batch 4K12005 - NO PREP  Blank (4K12005-BLK1)	(Dissolved) -		Control		Prepare <b>Spike</b>	ed: 11/12/201- <b>Source</b>	4 08:06 Anal	yzed: 11/12/2 %REC	2014 15:00	RPD	Not
assical Chemistry Parameters  Batch 4K12005 - NO PREP	(Dissolved) -	Flaq	Control	Units	Prepare Spike Level	ed: 11/12/201- <b>Source</b>	4 08:06 Anal	/zed: 11/12/2 %REC <u>Limits</u>	2014 15:00 RPD	RPD	Not
assical Chemistry Parameters  Batch 4K12005 - NO PREP  Blank (4K12005-BLK1)  malyte  otal Organic Carbon	(Dissolved) -	Flaq	POL 1.0	Units	Prepare Spike Level Prepare	ed: 11/12/201-  Source Result  ed: 11/12/201-  Source	4 08:06 Anal %REC 4 08:06 Anal	%REC Limits yzed: 11/12/2	RPD 2014 15:00	RPD <u>Limit</u>	
Blank (4K12005 - NO PREP  Blank (4K12005-BLK1)  malvte  btal Organic Carbon  LCS (4K12005-BS1)	Result 0.32	<b>Flaq</b> U	Control	<b>Units</b> mg/L	Prepare Spike Level Prepare	ed: 11/12/201- <b>Source Result</b> ed: 11/12/201-	4 08:06 Anal	%REC Limits yzed: 11/12/2	2014 15:00 RPD	RPD <u>Limit</u>	
Blank (4K12005 - NO PREP  Blank (4K12005-BLK1)  malyte otal Organic Carbon  LCS (4K12005-BS1)	Result 0.32  Result 38	<b>Flaq</b> U	POL 1.0	Units mg/L	Prepare  Spike Level  Prepare  Spike Level 40.0	ed: 11/12/201-  Source Result  ed: 11/12/201-  Source	4 08:06 Anal <b>%REC</b> 4 08:06 Anal <b>%REC</b> 96	%REC Limits %REC Limits %REC Limits %REC Limits 85-115	RPD 2014 15:00 RPD	RPD <u>Limit</u>	
Batch 4K12005 - NO PREP  Blank (4K12005-BLK1)  Inalyte  Otal Organic Carbon  LCS (4K12005-BS1)  Inalyte  Otal Organic Carbon	Result 0.32  Result 38	<b>Flaq</b> U	POL 1.0	Units mg/L	Prepare  Spike Level  Prepare  Spike Level  40.0  Prepare	Source Result  Source Result  Source Result  Source Result	4 08:06 Anal <b>%REC</b> 4 08:06 Anal <b>%REC</b> 96	%REC Limits // WREC Limits // WREC Limits // WREC Limits // 85-115 // Zed: 11/12/2	RPD 2014 15:00 RPD	RPD <u>Limit</u> RPD <u>Limit</u>	
Blank (4K12005 - NO PREP  Blank (4K12005-BLK1)  malvte  btal Organic Carbon  LCS (4K12005-BS1)  malvte  btal Organic Carbon  Matrix Spike (4K12005-MS1)	Result 0.32  Result 38	<b>Flaq</b> U	POL 1.0	Units mg/L	Prepare  Spike Level  Prepare  Spike Level 40.0	Source Result  Source Result  Source Result  Source Result  Source Result  Source Result	4 08:06 Anal <b>%REC</b> 4 08:06 Anal <b>%REC</b> 96	%REC Limits  %REC Limits  yzed: 11/12/2  %REC Limits  85-115  yzed: 11/12/2  %REC	RPD 2014 15:00 RPD	RPD Limit RPD Limit	Not
Blank (4K12005 - NO PREP  Blank (4K12005-BLK1)  Blank (4K12005-BLK1)  Blank (4K12005-BS1)  LCS (4K12005-BS1)  Blank (4K12005-BS1)  Matrix Spike (4K12005-MS1)  Source: A406493-01	Result 0.32  Result 38	Flag U Flag	POL 1.0 POL 1.0	Units mg/L Units mg/L	Prepare  Spike Level  Prepare  Spike Level  40.0  Prepare	Source Result  Source Result  Source Result  Source Result	4 08:06 Anal <b>%REC</b> 4 08:06 Anal <b>%REC</b> 96 4 08:06 Anal	%REC Limits // WREC Limits // WREC Limits // WREC Limits // 85-115 // Zed: 11/12/2	RPD 2014 15:00 RPD 2014 15:00 RPD	RPD <u>Limit</u> RPD <u>Limit</u>	Not Not QM-
Blank (4K12005 - NO PREP  Blank (4K12005-BLK1)  malvte btal Organic Carbon  LCS (4K12005-BS1)  malvte btal Organic Carbon  Matrix Spike (4K12005-MS1)  Source: A406493-01	Result 38  Result 38	Flag U Flag	POL 1.0  POL 1.0	Units mg/L  Units mg/L	Prepare  Spike Level  40.0  Prepare  Spike Level 40.0  Prepare  40.0	Source Result  Source Result  Source Result  Source Result  Source Result  Source Result	4 08:06 Anal %REC 4 08:06 Anal  %REC 96 4 08:06 Anal	%REC Limits 85-115 yzed: 11/12/2 %REC Limits 85-115 yzed: 11/12/2 %REC Limits 85-115	RPD 2014 15:00  RPD 2014 15:00  RPD 2014 15:00	RPD Limit RPD Limit	<u>Not</u>
Blank (4K12005 - NO PREP  Blank (4K12005-BLK1)  malvte  btal Organic Carbon  LCS (4K12005-BS1)  malvte  btal Organic Carbon  Matrix Spike (4K12005-MS1)  Source: A406493-01  malvte  btal Organic Carbon	Result 38  Result 38	Flag U Flag	POL 1.0  POL 1.0	Units mg/L  Units mg/L	Prepare  Spike Level  Prepare  Spike Level  40.0  Prepare  40.0  Prepare	Source Result  Source Result  Source Result  Source Result  2.0  ed: 11/12/201-	4 08:06 Anal %REC 4 08:06 Anal  %REC 96 4 08:06 Anal	%REC Limits // WREC Limits // WREC Limits // WREC Limits // 85-115 // WREC Limits	RPD 2014 15:00  RPD 2014 15:00  RPD 2014 15:00	RPD Limit RPD Limit	<u>Not</u>
Blank (4K12005 - NO PREP  Blank (4K12005-BLK1)  Blank (4K12005-BLK1)  Blank (4K12005-BS1)  LCS (4K12005-BS1)  Matrix Spike (4K12005-MS1)  Source: A406493-01  malyte  btal Organic Carbon  Matrix Spike (4K12005-MS1)  Matrix Spike Dup (4K12005-MS1)	Result 38  Result 38	Flag U Flag	POL 1.0  POL 1.0	Units mg/L  Units mg/L	Prepare  Spike Level  40.0  Prepare  Spike Level 40.0  Prepare  40.0	Source Result  Source Result  Source Result  Source Result  Source Result  Source Result  2.0	4 08:06 Anal %REC 4 08:06 Anal  %REC 96 4 08:06 Anal	%REC Limits 85-115 yzed: 11/12/2 %REC Limits 85-115 yzed: 11/12/2 %REC Limits 85-115	RPD 2014 15:00  RPD 2014 15:00  RPD 2014 15:00	RPD Limit RPD Limit	<u>Not</u>



#### **FLAGS/NOTES AND DEFINITIONS**

- **B** The analyte was detected in the associated method blank.
- **D** The sample was analyzed at dilution.
- The reported value is between the laboratory method detection limit (MDL) and the laboratory method reporting limit (MRL), adjusted for actual sample preparation data and moisture content, where applicable.
- **U** The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
- **E** The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate.
- MRL Method Reporting Limit. The MRL is roughly equivalent to the practical quantitation limit (PQL) and is based on the low point of the calibration curve, when applicable, sample preparation factor, dilution factor, and, in the case of soil samples, moisture content.
- **ND** The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
- **N** The analysis indicates the presence of an analyte for which there is presumptive evidence (85% or greater confidence) to make a "tentative identification".
- **P** Greater than 25% concentration difference was observed between the primary and secondary GC column. The lower concentration is reported.
- **J-01** Result is estimated due to positive results in the associated method blank.
- **QM-05** The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.
- **QM-07** The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS recovery.
- **QM-08** Post-digestion spike did not meet method requirements due to confirmed matrix effects (dilution test).
- **R-05** The sample was diluted due to the presence of high levels of non-target analytes resulting in elevated reporting limits.



#### ENVIRONMENTAL CONSERVATION LABORATORIES CHAIN-OF-CUSTODY RECORD

www.encolabs.com

Orlando, FL 32824 (407) 826-5314 Fax (407) 850-6945

4810 Executive Park Court, Sujte 111 Jacksonville, FL 32216-6069 (904) 296-3007 Fax (904) 296-6210

102-A Woodwinds Industrial Ct. Cary, NC 27511 (919) 467-3090 Fax (919) 467-3515

Page \_\_\_\_ of \_\_\_

ient Name Project Number							Requested Analyses									Requested Turnaround
The Catena Group	(TH015		[none	<b>a</b> ]					_			1000				Times
Address	411010	7	Project Name/I	Desc			1 00		77	-		0			ı	Note : Rush requests subject to
410-B Millstone Dr	rive		Swift	Creek Wa	ter Quality	,	0)		Pb			2			_	acceptance by the facility
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Item # Sample ID (Field Identifi	ication)	Collection Date	Collection Time	Comp / Grab	Matrix (see codes)	Total # of Containers										Sample Comments
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2	ווערוווע vvate	. Note : All samp	les submitted to	vv vv-vvastewater ENCO Labs are ir	accordance with	detail in comments of the terms and co	onditions lis						NO-NaOH O-Oth n agreements exi		mments)	

102-A Woodwinds Industrial Court Cary NC, 27511

Phone: 919.467.3090 FAX: 919.467.3515

Friday, December 12, 2014 The Catena Group (TH015) Attn: Nancy Scott 410-B Millstone Drive Hillsborough, NC 27278

RE: Laboratory Results for

Project Number: [none], Project Name/Desc: Swift Creek Water Quality

ENCO Workorder(s): C414195

Dear Nancy Scott,

Enclosed is a copy of your laboratory report for test samples received by our laboratory on Wednesday, November 19, 2014.

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. Results for these procedures apply only to the samples as submitted.

The analytical results contained in this report are in compliance with NELAC standards, except as noted in the project narrative. This report shall not be reproduced except in full, without the written approval of the Laboratory.

This report contains only those analyses performed by Environmental Conservation Laboratories. Unless otherwise noted, all analyses were performed at ENCO Cary. Data from outside organizations will be reported under separate cover.

If you have any questions or require further information, please do not hesitate to contact me.

Sill Scatt

Sincerely,

Bill Scott

Project Manager

Enclosure(s)



### **PROJECT NARRATIVE**

Date: December 12, 2014

Client: The Catena Group (TH015)
Project: Swift Creek Water Quality

Lab ID: C414195

### Overview

This report is an amendment to the original report for this work order. This report was revised to remove Mn results and report Mg.

Environmental Conservation Laboratories, Inc. (ENCO) analyzed all submitted samples in accordance with the methods referenced in the laboratory report. Any particular difficulties encountered during sample handling by ENCO are discussed in the QC Remarks section below.

**Quality Control Samples** 

No Comments

**Quality Control Remarks** 

No Comments

Other Comments

The analytical data presented in this report are consistent with the methods as referenced in the analytical report. Any exceptions or deviations are noted in the QC remarks section of this narrative or in the Flags/Notes and Definitions section of the report.

Released By:

Environmental Conservation Laboratories, Inc.

Bill Scott

Project Manager



# SAMPLE SUMMARY/LABORATORY CHRONICLE

Client ID: NC-210		Lab ID:	C414195-01	Sampled:	11/19/14 09:45	Received: 11/19/14 11:20
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	/Time(s)	Analysis Date/	Time(s)
EPA 300.0	12/17/14		11/21/14	09:08	11/25/14 00:33	
EPA 310.2	12/03/14		11/25/14	08:44	11/25/14 11:17	
EPA 350.1	12/17/14		11/21/14	09:21	11/21/14 10:21	
EPA 6010C	05/18/15		11/20/14	09:17	11/21/14 12:43	
EPA 6010C	05/18/15		11/25/14	18:27	12/03/14 09:03	
SM 5310B-2000	12/17/14		11/21/14	14:06	11/21/14 16:57	
Client ID: SR-1555		Lab ID:	C414195-02	Sampled:	11/19/14 10:15	Received: 11/19/14 11:20
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	/Time(s)	Analysis Date/	Time(s)
EPA 300.0	12/17/14		11/21/14	09:08	11/25/14 00:50	
EPA 310.2	12/03/14		11/25/14	08:44	11/25/14 11:18	
EPA 350.1	12/17/14		11/21/14	09:21	11/21/14 10:28	
EPA 6010C	05/18/15		11/20/14	09:17	11/21/14 12:53	
EPA 6010C	05/18/15		11/25/14	18:27	12/03/14 09:15	
SM 5310B-2000	12/17/14		11/21/14	14:06	11/21/14 16:57	
Client ID: NC-50		Lab ID:	C414195-03	Sampled:	11/19/14 10:50	Received: 11/19/14 11:20
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	/Time(s)	Analysis Date/	Time(s)
EPA 300.0	12/17/14		11/21/14	09:08	11/25/14 01:07	
EPA 310.2	12/03/14		11/25/14	08:44	11/25/14 11:19	
EPA 350.1	12/17/14		11/21/14	09:21	11/21/14 10:34	
EPA 6010C	05/18/15		11/20/14	09:17	11/21/14 12:56	
EPA 6010C	05/18/15		11/25/14	18:27	12/03/14 09:18	
SM 5310B-2000	12/17/14		11/21/14	14:06	11/21/14 16:57	



# **SAMPLE DETECTION SUMMARY**

Client ID: NC-210			Lab ID:	C414195-01			
<u>Analyte</u>	<u>Results</u>	<u>Flag</u>	MDL	<u>PQL</u>	<u>Units</u>	<u>Method</u>	Notes
Ammonia as N	0.58		0.045	0.10	mg/L	EPA 350.1	
Calcium - Total	6460		39.0	100	ug/L	EPA 6010C	
Chloride	7.2		2.2	5.0	mg/L	EPA 300.0	
Magnesium - Total	2470		23.0	100	ug/L	EPA 6010C	
Potassium - Total	3080		150	500	ug/L	EPA 6010C	
Sodium - Total	7420		400	500	ug/L	EPA 6010C	
Sulfate as SO4	3.7	J	2.9	5.0	mg/L	EPA 300.0	
Total Alkalinity as CaCO3	35		14	15	mg/L	EPA 310.2	
Total Organic Carbon - Dissolved	0.44	J	0.32	1.0	mg/L	SM 5310B-2000	
Client ID: SR-1555			Lab ID:	C414195-02			
<u>unalyte</u>	<u>Results</u>	<u>Flag</u>	<u>MDL</u>	<u>PQL</u>	<u>Units</u>	<u>Method</u>	<u>Notes</u>
Ammonia as N	0.35		0.045	0.10	mg/L	EPA 350.1	
Calcium - Total	6160		39.0	100	ug/L	EPA 6010C	
Chloride	5.2		2.2	5.0	mg/L	EPA 300.0	
Magnesium - Total	2200		23.0	100	ug/L	EPA 6010C	
Potassium - Total	3770		150	500	ug/L	EPA 6010C	
Sodium - Total	7790		400	500	ug/L	EPA 6010C	
Sulfate as SO4	3.7	J	2.9	5.0	mg/L	EPA 300.0	
Total Alkalinity as CaCO3	26		14	15	mg/L	EPA 310.2	
Total Organic Carbon - Dissolved	0.46	J	0.32	1.0	mg/L	SM 5310B-2000	
Client ID: NC-50			Lab ID:	C414195-03			
<u>nalyte</u>	<u>Results</u>	<u>Flag</u>	<u>MDL</u>	<u>PQL</u>	<u>Units</u>	<u>Method</u>	<u>Notes</u>
Ammonia as N	0.25		0.045	0.10	mg/L	EPA 350.1	
Calcium - Total	6010		39.0	100	ug/L	EPA 6010C	
Chloride	7.2		2.2	5.0	mg/L	EPA 300.0	
Copper - Dissolved	1.96	J	1.60	10.0	ug/L	EPA 6010C	
Magnesium - Total	1910		23.0	100	ug/L	EPA 6010C	
Potassium - Total	3250		150	500	ug/L	EPA 6010C	
Sodium - Total	4760		400	500	ug/L	EPA 6010C	
Sulfate as SO4	3.7	J	2.9	5.0	mg/L	EPA 300.0	
Total Alkalinity as CaCO3	26		14	15	mg/L	EPA 310.2	
Total Organic Carbon - Dissolved	0.79	J	0.32	1.0	mg/L	SM 5310B-2000	
Zinc - Total	6.14	J	3.80	10.0	ug/L	EPA 6010C	



# **ANALYTICAL RESULTS**

**Description:** NC-210 **Lab Sample ID:** C414195-01 **Received:** 11/19/14 11:20

 Matrix:
 Water
 Sampled: 11/19/14 09:45
 Work Order: C414195

**Project:** Swift Creek Water Quality Sampled By: Nancy Scott

# Metals (total recoverable) by EPA 6000/7000 Series Methods

ΛΕ	NCO	Cani	certified	analuta	<b>TNC</b>	E017
^ - F	NULL	<i>carv</i>	certitien	anaivre	//V(	5911

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Cadmium [7440-43-9]^	ND		ug/L	1	0.360	1.00	4K21043	EPA 6010C	12/03/14 09:03	JDH	
Calcium [7440-70-2]^	6460		ug/L	1	39.0	100	4K21043	EPA 6010C	12/03/14 09:03	JDH	
Copper [7440-50-8]^	ND		ug/L	1	1.60	10.0	4K21043	EPA 6010C	12/03/14 09:03	JDH	
Lead [7439-92-1]^	ND		ug/L	1	2.10	10.0	4K21043	EPA 6010C	12/03/14 09:03	JDH	
Magnesium [7439-95-4]^	2470		ug/L	1	23.0	100	4K21043	EPA 6010C	12/03/14 09:03	JDH	
Nickel [7440-02-0]^	ND		ug/L	1	1.80	10.0	4K21043	EPA 6010C	12/03/14 09:03	JDH	
Potassium [7440-09-7]^	3080		ug/L	1	150	500	4K21043	EPA 6010C	12/03/14 09:03	JDH	
Sodium [7440-23-5]^	7420		ug/L	1	400	500	4K21043	EPA 6010C	12/03/14 09:03	JDH	
Zinc [7440-66-6]^	ND		ug/L	1	3.80	10.0	4K21043	EPA 6010C	12/03/14 09:03	JDH	

# Metals (Dissolved) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	MDL	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Copper [7440-50-8]^	ND		ug/L	1	1.60	10.0	4K20007	EPA 6010C	11/21/14 12:43	JDH	

# **Classical Chemistry Parameters**

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	MDL	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Ammonia as N [7664-41-7]^	0.58		mg/L	1	0.045	0.10	4K20012	EPA 350.1	11/21/14 10:21	SHA	
Chloride [16887-00-6]^	7.2		mg/L	1	2.2	5.0	4K21005	EPA 300.0	11/25/14 00:33	AJB	
Sulfate as SO4 [14808-79-8]^	3.7	J	mg/L	1	2.9	5.0	4K21005	EPA 300.0	11/25/14 00:33	AJB	
Total Alkalinity as CaCO3 [471-34-1]^	35		mg/L	1	14	15	4K25010	EPA 310.2	11/25/14 11:17	AJB	

# Classical Chemistry Parameters (Dissolved)

^ - ENCO Orlando certified analyte [NC 424]

Analyte [CAS Number]	Results	Flag	<u>Units</u>	<u>DF</u>	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	Ву	<u>Notes</u>
Total Organic Carbon^	0.44	J	mg/L	1	0.32	1.0	4K21035	SM 5310B-2000	11/21/14 16:57	RSA	



Work Order: C414195

# **ANALYTICAL RESULTS**

**Description:** SR-1555 **Lab Sample ID:** C414195-02 **Received:** 11/19/14 11:20

**Matrix:** Water **Sampled:** 11/19/14 10:15

Project: Swift Creek Water Quality Sampled By: Nancy Scott

# Metals (total recoverable) by EPA 6000/7000 Series Methods

^ - FNCO	Carv	certified	analyte	[NC	5017

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Cadmium [7440-43-9]^	ND		ug/L	1	0.360	1.00	4K21043	EPA 6010C	12/03/14 09:15	JDH	
Calcium [7440-70-2]^	6160		ug/L	1	39.0	100	4K21043	EPA 6010C	12/03/14 09:15	JDH	
Copper [7440-50-8]^	ND		ug/L	1	1.60	10.0	4K21043	EPA 6010C	12/03/14 09:15	JDH	
Lead [7439-92-1]^	ND		ug/L	1	2.10	10.0	4K21043	EPA 6010C	12/03/14 09:15	JDH	
Magnesium [7439-95-4]^	2200		ug/L	1	23.0	100	4K21043	EPA 6010C	12/03/14 09:15	JDH	
Nickel [7440-02-0]^	ND		ug/L	1	1.80	10.0	4K21043	EPA 6010C	12/03/14 09:15	JDH	
Potassium [7440-09-7]^	3770		ug/L	1	150	500	4K21043	EPA 6010C	12/03/14 09:15	JDH	
Sodium [7440-23-5]^	7790		ug/L	1	400	500	4K21043	EPA 6010C	12/03/14 09:15	JDH	
Zinc [7440-66-6]^	ND		ug/L	1	3.80	10.0	4K21043	EPA 6010C	12/03/14 09:15	JDH	

# Metals (Dissolved) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	MDL	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Copper [7440-50-8]^	ND		ug/L	1	1.60	10.0	4K20007	EPA 6010C	11/21/14 12:53	JDH	

# **Classical Chemistry Parameters**

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	MDL	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	<u>Ву</u>	<u>Notes</u>
Ammonia as N [7664-41-7]^	0.35		mg/L	1	0.045	0.10	4K20012	EPA 350.1	11/21/14 10:28	SHA	
Chloride [16887-00-6]^	5.2		mg/L	1	2.2	5.0	4K21005	EPA 300.0	11/25/14 00:50	AJB	
Sulfate as SO4 [14808-79-8]^	3.7	J	mg/L	1	2.9	5.0	4K21005	EPA 300.0	11/25/14 00:50	AJB	
Total Alkalinity as CaCO3 [471-34-1]^	26		mg/L	1	14	15	4K25010	EPA 310.2	11/25/14 11:18	AJB	

# Classical Chemistry Parameters (Dissolved)

^ - ENCO Orlando certified analyte [NC 424]

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	DF	<u>MDL</u>	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<b>Analyzed</b>	<u>By</u>	<u>Notes</u>
Total Organic Carbon^	0.46	J	mg/L	1	0.32	1.0	4K21035	SM 5310B-2000	11/21/14 16:57	RSA	



Work Order: C414195

# **ANALYTICAL RESULTS**

**Description:** NC-50 **Lab Sample ID:** C414195-03 **Received:** 11/19/14 11:20

**Matrix:** Water **Sampled:** 11/19/14 10:50

**Project:** Swift Creek Water Quality Sampled By: Nancy Scott

# Metals (total recoverable) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Cadmium [7440-43-9]^	ND		ug/L	1	0.360	1.00	4K21043	EPA 6010C	12/03/14 09:18	JDH	
Calcium [7440-70-2]^	6010		ug/L	1	39.0	100	4K21043	EPA 6010C	12/03/14 09:18	JDH	
Copper [7440-50-8]^	ND		ug/L	1	1.60	10.0	4K21043	EPA 6010C	12/03/14 09:18	JDH	
Lead [7439-92-1]^	ND		ug/L	1	2.10	10.0	4K21043	EPA 6010C	12/03/14 09:18	JDH	
Magnesium [7439-95-4]^	1910		ug/L	1	23.0	100	4K21043	EPA 6010C	12/03/14 09:18	JDH	
Nickel [7440-02-0]^	ND		ug/L	1	1.80	10.0	4K21043	EPA 6010C	12/03/14 09:18	JDH	
Potassium [7440-09-7]^	3250		ug/L	1	150	500	4K21043	EPA 6010C	12/03/14 09:18	JDH	
Sodium [7440-23-5]^	4760		ug/L	1	400	500	4K21043	EPA 6010C	12/03/14 09:18	JDH	
Zinc [7440-66-6]^	6.14	J	ug/L	1	3.80	10.0	4K21043	EPA 6010C	12/03/14 09:18	JDH	

# Metals (Dissolved) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Copper [7440-50-8]^	1.96	J	ua/L	1	1.60	10.0	4K20007	EPA 6010C	11/21/14 12:56	JDH	

# **Classical Chemistry Parameters**

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	MDL	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Ammonia as N [7664-41-7]^	0.25		mg/L	1	0.045	0.10	4K20012	EPA 350.1	11/21/14 10:34	SHA	
Chloride [16887-00-6]^	7.2		mg/L	1	2.2	5.0	4K21005	EPA 300.0	11/25/14 01:07	AJB	
Sulfate as SO4 [14808-79-8]^	3.7	J	mg/L	1	2.9	5.0	4K21005	EPA 300.0	11/25/14 01:07	AJB	
Total Alkalinity as CaCO3 [471-34-1]^	26		mg/L	1	14	15	4K25010	EPA 310.2	11/25/14 11:19	AJB	

# Classical Chemistry Parameters (Dissolved)

^ - ENCO Orlando certified analyte [NC 424]

Analyte [CAS Number]	<u>Results</u>	Flag	<u>Units</u>	<u>DF</u>	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Total Organic Carbon^	0.79	J	mg/L	1	0.32	1.0	4K21035	SM 5310B-2000	11/21/14 16:57	RSA	



# Metals (total recoverable) by EPA 6000/7000 Series Methods - Quality Control

### Batch 4K21043 - EPA 3005A

**Blank (4K21043-BLK1)** Prepared: 11/25/2014 18:27 Analyzed: 12/03/2014 08:56

Analyte	Result	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	<u>Notes</u>
Cadmium	0.360	U	1.00	ug/L							
Calcium	39.0	U	100	ug/L							
Copper	1.60	U	10.0	ug/L							
Lead	2.10	U	10.0	ug/L							
Magnesium	23.0	U	100	ug/L							
Nickel	1.80	U	10.0	ug/L							
Potassium	150	U	500	ug/L							
Sodium	400	U	500	ug/L							
Zinc	3.80	U	10.0	ug/L							

ı	LCS (4K21043-BS1)	Prepared: 11/25/2014 18:27 Analyzed: 12/03/2014 09:00

					Spike	Source		%REC		RPD	
Analyte	Result	Flag	<u>POL</u>	<u>Units</u>	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Notes
Cadmium	19.9		1.00	ug/L	20.0		100	80-120			
Calcium	2110		100	ug/L	2000		105	80-120			
Copper	195		10.0	ug/L	200		97	80-120			
Lead	198		10.0	ug/L	200		99	80-120			
Magnesium	2040		100	ug/L	2000		102	80-120			
Nickel	201		10.0	ug/L	200		101	80-120			
Potassium	10100		500	ug/L	10000		101	80-120			
Sodium	10300		500	ug/L	10000		103	80-120			
Zinc	203		10.0	ug/L	200		101	80-120			

Matrix Spike (4K21043-MS1) Prepared: 11/25/2014 18:27 Analyzed: 12/03/2014 09:05

Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Cadmium	20.2				20.0	0.360 U	101	75-125	2		
Caumum	20.2		1.00	ug/L	20.0	0.300 0	101	75-125			
Calcium	8280		100	ug/L	2000	6460	91	75-125			
Copper	198		10.0	ug/L	200	1.60 U	99	75-125			
Lead	203		10.0	ug/L	200	2.10 U	102	75-125			
Magnesium	4440		100	ug/L	2000	2470	98	75-125			
Nickel	203		10.0	ug/L	200	1.80 U	102	75-125			
Potassium	13000		500	ug/L	10000	3080	99	75-125			
Sodium	17400		500	ug/L	10000	7420	100	75-125			
Zinc	206		10.0	ug/L	200	3.80 U	103	75-125			

Matrix Spike Dup (4K21043-MSD1) Prepared: 11/25/2014 18:27 Analyzed: 12/03/2014 09:08

Source:	C414195-01

Source: C414195-01

<u>Analyte</u>	<u>Result</u>	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source Result	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Cadmium	21.0		1.00	ug/L	20.0	0.360 U	105	75-125	4	20	
Calcium	8440		100	ug/L	2000	6460	99	75-125	2	20	
Copper	197		10.0	ug/L	200	1.60 U	98	75-125	0.3	20	
Lead	204		10.0	ug/L	200	2.10 U	102	75-125	0.3	20	
Magnesium	4480		100	ug/L	2000	2470	100	75-125	0.9	20	
Nickel	210		10.0	ug/L	200	1.80 U	105	75-125	3	20	
Potassium	13300		500	ug/L	10000	3080	103	75-125	3	20	
Sodium	17800		500	ug/L	10000	7420	104	75-125	2	20	
Zinc	214		10.0	ug/L	200	3.80 U	107	75-125	4	20	



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Post Spike (4K21043-PS1)		Prepared: 11/25/2014 18:27 Analyzed: 12/03/2014 09:10											
Source: C414195-01													
<u>Analyte</u>	Result	Flag	PQL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	<u>Notes</u>		
Cadmium	0.0190		0.00100	mg/L	0.0200	5.18E-5	95	80-120					
Calcium	8.15		0.100	mg/L	2.00	6.46	84	80-120					
Copper	0.181		0.0100	mg/L	0.200	-0.000376	91	80-120					
Lead	0.182		0.0100	mg/L	0.200	-0.000727	91	80-120					
Magnesium	4.31		0.100	mg/L	2.00	2.47	92	80-120					
Nickel	0.190		0.0100	mg/L	0.200	-0.000524	95	80-120					
Potassium	12.2		0.500	mg/L	10.0	3.08	92	80-120					
Sodium	16.5		0.500	mg/L	10.0	7.42	91	80-120					
Zinc	0.195		0.0100	mg/L	0.200	0.00190	96	80-120					

# Batch 4K20007 - EPA 3005A

Prepared: 11,	/20/2014 09:1/ Analyzed: 11/21/2014 11:29
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Analyte	Result	Flag	POL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Copper	1.60	U	10.0	ug/L							

LCS (4K20007-BS1) Prepared: 11/20/2014 09:17 Analyzed: 11/21/2014 11:32

Analyte	Result	Flag	PQL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Copper	200		10.0	ug/L	200		100	80-120			

 Matrix Spike (4K20007-MS1)
 Prepared: 11/20/2014 09:17 Analyzed: 11/21/2014 12:19

Source: C414012-01

<u>Analyte</u>	Result	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Copper	207		10.0	ug/L	200	1.60 U	104	75-125			

 Matrix Spike Dup (4K20007-MSD1)
 Prepared: 11/20/2014 09:17 Analyzed: 11/21/2014 12:21

Source: C414012-01

Analyte	Result	Flag F	PQL	<u>Units</u>	Level	Result	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Notes
Copper	206	:	10.0	ug/L	200	1.60 U	103	75-125	0.6	20	

**Post Spike (4K20007-PS1)** Prepared: 11/20/2014 09:17 Analyzed: 11/21/2014 12:24

Source: C414012-01

<u>Analyte</u>	Result	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Copper	0.186		0.0100	mg/L	0.200	0.00104	92	80-120			

# Classical Chemistry Parameters - Quality Control

# Batch 4K20012 - NO PREP

Blank (4K20012-BLK1)	Prepared: 11/21/2014 09:21 Analyzed: 11/21/2014 10:17

Analyte	Result	Flag	PQL	<u>Units</u>	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Ammonia as N	0.045	U	0.10	mg/L	Level	Result	70KLC	Lillies	KFD	Lillie	itotes



Batch 4K20012 - NO PREP - 0	Continued										
						1 44/24/204	4.00.24.4	1 44 /24 /	20111010		
LCS (4K20012-BS1)					Prepare	ed: 11/21/201	4 09:21 Anal	yzed: 11/21/.	2014 10:19		
					Spike	Source		%REC		RPD	
<u>inalyte</u>	Result	Flag	<u>PQL</u>	<u>Units</u>	Level	Result	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Note
nmonia as N	1.0		0.10	mg/L	0.997		103	90-110			
Matrix Spike (4K20012-MS1)					Prepare	ed: 11/21/201	4 09:21 Anal	yzed: 11/21/	2014 10:24		
Source: C414195-01					- "	_		2/ ===			
<u>nalyte</u>	Result	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Note
nmonia as N	0.99		0.10	mg/L	0.387	0.58	104	90-110			
Matrix Spike Dup (4K20012-MS	D1)				Prepare	ed: 11/21/201	4 09:21 Anal	yzed: 11/21/2	2014 10:26		
Source: C414195-01											
nalyte	Result	Flag	PQL	Units	Spike	Source	0/- DEC	%REC	BBD	RPD	Note
n <b>alyte</b> nmonia as N	0.99	ı ıay	0.10	mg/L	<b>Level</b> 0.387	<u><b>Result</b></u> 0.58	<b>%REC</b> 105	<u>Limits</u> 90-110	<b>RPD</b> 0.4	<u>Limit</u> 10	Note
Batch 4K21005 - NO PREP	0.55		0.10	my/L	0.36/	0.30	103	20-110	0.4	10	
Daten 4K21005 - NO FREF											
Blank (4K21005-BLK1)					Prepare	ed: 11/21/201	4 09:08 Anal	yzed: 11/24/	2014 16:37		
						_					
<u>nalyte</u>	Result	Flag	PQL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Not
loride	2.2	U	5.0	mg/L				·			
lfate as SO4	2.9	U	5.0	mg/L							
LCS (4K21005-BS1)					Prepare	ed: 11/21/201	4 09:08 Anal	yzed: 11/24/2	2014 19:10		
<u>nalyte</u>	Result	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source Result	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Note
loride	48		5.0	mg/L	50.0		96	90-110			
lfate as SO4	47		5.0	mg/L	50.0		95	90-110			
Matrix Spike (4K21005-MS1)					Prepare	ed: 11/21/201	4 09:08 Anal	yzed: 11/24/2	2014 19:27		
Source: C414319-01											
nalvte	Result	Flag	PQL	Units	Spike Level	Source	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Note
loride	20	riaq	5.0	mg/L	20.0	Result 3.1	82	90-110	KPD	Lillic	QM-
Ifate as SO4	19		5.0	mg/L	20.0	3.5	80	90-110			QM-
Matrix Spike Dup (4K21005-MS				<u> </u>		ed: 11/21/201			2014 20:18		
Source: C414319-01					·			,			
					Spike	Source		%REC		RPD	
<u>nalyte</u>	Result	<u>Flaq</u>	<u>PQL</u>	<u>Units</u>	Level	Result	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Note
loride	20		5.0	mg/L	20.0	3.1	86	90-110	3	10	QM-(
lfate as SO4  Batch 4K25010 - NO PREP	20		5.0	mg/L	20.0	3.5	83	90-110	3	10	QM-
Blank (4K25010-BLK1)					Prepare	ed: 11/25/201	4 08:44 Anal	yzed: 11/25/	2014 11:05		
					Spike	Source		%REC		RPD	
<u>nalyte</u>	Result	Flag	PQL	<u>Units</u>	Level	Result	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Note



Batch 4K25010 - NO PREF	P - Continued										
LCS (4K25010-BS1)					Prepare	ed: 11/25/201	4 08:44 Anal	yzed: 11/25/	2014 11:06		
nalyte	<u>Result</u>	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	<u>No</u>
tal Alkalinity as CaCO3	100		15	mg/L	100		102	80-120			
Matrix Spike (4K25010-MS1	)				Prepare	ed: 11/25/201	4 08:44 Anal	yzed: 11/25/	2014 11:07		
Source: C414111-01						_					
<u>ialyte</u>	Result	Flag	POL	<u>Units</u>	Spike Level	Source Result	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	<u>No</u>
al Alkalinity as CaCO3	43		15	mg/L	37.8	14 U	112	80-120			
Matrix Spike Dup (4K25010-	-MSD1)				Prepare	ed: 11/25/201	4 08:44 Anal	yzed: 11/25/	2014 11:08		
Source: C414111-01											
alvte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	N
al Alkalinity as CaCO3	38		15	mg/L	37.8	14 U	101	80-120	11	25	
ssical Chemistry Parameter	rs (Dissolved) -	Ouality (	Control								
B. I. J. 4//24 625 NO BREE	_										
Blank (4K21035 - NO PREF					Prepare	ed: 11/21/201	4 14:06 Anal	vzed: 11/21/	2014 16:57		
Blank (4K21035-BLK1)	,				Prepare	ed: 11/21/201	4 14:06 Anal	yzed: 11/21/	2014 16:57		
Blank (4K21035-BLK1)		Elag	POI	Unito	Spike	Source		%REC		RPD	
Blank (4K21035-BLK1)	Result	<u>Flag</u>	<b>POL</b>	<u>Units</u>			4 14:06 Anal %REC	,	2014 16:57 RPD	RPD <u>Limit</u>	N
Blank (4K21035-BLK1)		<b>Flag</b> U	<b>POL</b> 1.0	<u>Units</u> mg/L	Spike Level	Source	%REC	%REC <u>Limits</u>	RPD		N
Blank (4K21035-BLK1)  alvte al Organic Carbon	Result			<u> </u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD		N
Blank (4K21035-BLK1)  alvte al Organic Carbon  LCS (4K21035-BS1)	<b>Result</b> 0.32	U	1.0	mg/L	Spike Level Prepare	Source Result ed: 11/21/201	<b>%REC</b> 4 14:06 Anal	%REC <u>Limits</u> yzed: 11/21/2	<b>RPD</b> 2014 16:57	<u>Limit</u>	
alvte al Organic Carbon  LCS (4K21035-BS1)	Result			<u> </u>	Spike Level Prepare	Source Result ed: 11/21/201	%REC	%REC <u>Limits</u> yzed: 11/21/	RPD	<u>Limit</u>	
Blank (4K21035-BLK1)  allyte al Organic Carbon  LCS (4K21035-BS1)	Result 0.32  Result 45	U	1.0	mg/L Units	Spike Level  Prepare  Spike Level  40.0	Source Result ed: 11/21/201	<b>%REC</b> 4 14:06 Anal <b>%REC</b> 112	%REC <u>Limits</u> yzed: 11/21/: %REC <u>Limits</u> 85-115	RPD 2014 16:57 RPD	<u>Limit</u>	
alvte al Organic Carbon  LCS (4K21035-BS1)  alvte al Organic Carbon	Result 0.32  Result 45	U	1.0	mg/L Units	Spike Level  Prepare  Spike Level  40.0	Source Result  ed: 11/21/201  Source Result	<b>%REC</b> 4 14:06 Anal <b>%REC</b> 112	%REC <u>Limits</u> yzed: 11/21/: %REC <u>Limits</u> 85-115	RPD 2014 16:57 RPD	<u>Limit</u>	
Blank (4K21035-BLK1)  alvte al Organic Carbon  LCS (4K21035-BS1)  alvte al Organic Carbon  Matrix Spike (4K21035-MS1  Source: A406381-01	Result 0.32  Result 45	U	1.0	mg/L Units	Spike Level  Prepare  Spike Level  40.0	Source Result  Source Result  Source Result  Source	<b>%REC</b> 4 14:06 Anal <b>%REC</b> 112	%REC Limits  yzed: 11/21/:  %REC Limits  85-115  yzed: 11/21/:  %REC	RPD 2014 16:57 RPD	RPD Limit	N
alvte al Organic Carbon  LCS (4K21035-BS1)  alvte al Organic Carbon  Matrix Spike (4K21035-MS1)  Source: A406381-01	Result 0.32  Result 45	Flaq	1.0 POL 1.0	mg/L  Units  mg/L	Spike Level  Prepare  Spike Level  40.0  Prepare	Source Result  Source Result  Source Result  ed: 11/21/201	%REC 4 14:06 Anal  %REC 112 4 14:06 Anal	%REC Limits  yzed: 11/21/:  %REC Limits  85-115  yzed: 11/21/:	RPD  2014 16:57  RPD  2014 16:57	Limit RPD Limit	N
alyte al Organic Carbon  LCS (4K21035-BS1)  alyte al Organic Carbon  Matrix Spike (4K21035-MS1)  Source: A406381-01	Result           0.32           Result           45           )           Result           53	Flaq	POL 1.0	mg/L  Units  mg/L  Units	Spike Level  Spike Level 40.0  Prepare  Spike Level 40.0  40.0	Source Result  Source Result  Source Result  Source Result	%REC 4 14:06 Anal  %REC 112 4 14:06 Anal  %REC 115	%REC Limits  yzed: 11/21/:  %REC Limits  85-115  yzed: 11/21/:  %REC Limits  85-115	RPD 2014 16:57  RPD 2014 16:57	RPD Limit	N
alvte al Organic Carbon  LCS (4K21035-BS1)  alvte al Organic Carbon  Matrix Spike (4K21035-MS1  Source: A406381-01  alvte al Organic Carbon	Result           0.32           Result           45           )           Result           53	Flaq	POL 1.0	mg/L  Units  mg/L  Units	Spike Level  Spike Level 40.0  Prepare  Spike Level 40.0  40.0	Source Result  Source Result  Source Result  Source Result  6.7	%REC 4 14:06 Anal  %REC 112 4 14:06 Anal  %REC 115	%REC Limits  yzed: 11/21/:  %REC Limits  85-115  yzed: 11/21/:  %REC Limits  85-115	RPD 2014 16:57  RPD 2014 16:57	RPD Limit	N
Blank (4K21035-BLK1)  nalvte tal Organic Carbon  LCS (4K21035-BS1)  nalvte tal Organic Carbon  Matrix Spike (4K21035-MS1 Source: A406381-01  nalvte tal Organic Carbon  Matrix Spike Dup (4K21035-MS1)	Result           0.32           Result           45           )           Result           53	Flaq	1.0 POL 1.0	mg/L  Units  mg/L  Units	Spike Level  Spike Level 40.0  Prepare  Spike Level 40.0  40.0	Source Result  Source Result  Source Result  Source Result  6.7	%REC 4 14:06 Anal  %REC 112 4 14:06 Anal  %REC 115	%REC Limits  yzed: 11/21/:  %REC Limits  85-115  yzed: 11/21/:  %REC Limits  85-115	RPD 2014 16:57  RPD 2014 16:57	RPD Limit	N.



# **FLAGS/NOTES AND DEFINITIONS**

- **B** The analyte was detected in the associated method blank.
- **D** The sample was analyzed at dilution.
- The reported value is between the laboratory method detection limit (MDL) and the laboratory method reporting limit (MRL), adjusted for actual sample preparation data and moisture content, where applicable.
- **U** The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
- **E** The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate.
- MRL Method Reporting Limit. The MRL is roughly equivalent to the practical quantitation limit (PQL) and is based on the low point of the calibration curve, when applicable, sample preparation factor, dilution factor, and, in the case of soil samples, moisture content.
- **ND** The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
- **N** The analysis indicates the presence of an analyte for which there is presumptive evidence (85% or greater confidence) to make a "tentative identification".
- **P** Greater than 25% concentration difference was observed between the primary and secondary GC column. The lower concentration is reported.
- **QM-05** The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.

(407) 826-5314 Fax (407) 850-6945 10775 Central Port Dr. Orlando, FL 32824 

# CHAIN-OF-CUSTODY RECORD **ENVIRONMENTAL CONSERVATION LABORATORIES**

4810 Executive Park Court, Suite 211 Jacksonville, FL 32216-6069

(904) 296-3007 Fax (904) 296-6210

102-A Woodwinds Industrial Ct. Cary, NC 27511

www.encolabs.com

Note: Rush requests subject to acceptance by the facility Requested Turnaround Expedited Standard Times Page Due (919) 467-3090 Fax (919) 467-3515 Requested Analy MINUTED Paniasid Amonia Swift Creek Moter and ity

2914195

ab Workorder

Namey Scott

Dancy Set

Sampler(s) Signature

919 732-1300

Billing Contact

Site Location / Time Zone

Nancy Scott

Reporting Contact

PO # / Billing Info

CHINSBORCOUGH, NC 27278

Address Address Millstone Drive

The Catena Group

Project Name/Desi

Project Number

Sample Comments Preservation (See Codes) (Combine <-- Total # of Containers Total # of Containers Matrix (see codes) Comp / Grab Relinquished By A 11/14/14/10:50 Collection Time 11/19/14/10/15 11 19 14 19:45 Collection Date Date/Time Sample ID (Field Identification) NC-210-SP 1555 NO. 50 sample Kit Prepared By Item #

Preservation: I-Ice H-HCI N-HNO3 S-H2SO4 NO-NaOH O-Other (detail in comments) Cooler #'s & Temps on Receipt

Solid Water SE-Sediment SW-Surface Water WW-Wastewater A-Air O-Other (detail in comments)

Note : All samples submitted to ENCO Labs are in accordance with the terms and condit

Sooler #'s & Temps on Receipt

elinquished By

Comments/Special Reporting Requirements

repeat

Relinquished By

Note: All samples submitted to ENCO Labs are in accordance with the terms and conditions listed on the reverse of this form, unless prior written agreements exist

0. M

Unacceptable

Acceptable

condition Upon Receipt

1120

11 1-1 / LLL Date/Time

Date/Time

Received By

Date/Time

102-A Woodwinds Industrial Court Cary NC, 27511

Phone: 919.467.3090 FAX: 919.467.3515

Wednesday, December 31, 2014 The Catena Group (TH015) Attn: Nancy Scott 410-B Millstone Drive Hillsborough, NC 27278

RE: Laboratory Results for

Project Number: [none], Project Name/Desc: Swift Creek Water Quality

ENCO Workorder(s): C416681

Dear Nancy Scott,

Enclosed is a copy of your laboratory report for test samples received by our laboratory on Tuesday, December 16, 2014.

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. Results for these procedures apply only to the samples as submitted.

The analytical results contained in this report are in compliance with NELAC standards, except as noted in the project narrative. This report shall not be reproduced except in full, without the written approval of the Laboratory.

This report contains only those analyses performed by Environmental Conservation Laboratories. Unless otherwise noted, all analyses were performed at ENCO Cary. Data from outside organizations will be reported under separate cover.

If you have any questions or require further information, please do not hesitate to contact me.

Sill Scatt

Sincerely,

Bill Scott

Project Manager

Enclosure(s)



# SAMPLE SUMMARY/LABORATORY CHRONICLE

Client ID: SR-1555		Lab ID:	C416681-01	Sampled:	12/16/14 10:00	Received: 12/16/14 15:42
<u>Parameter</u>	Hold Date/Time(s)		Prep Date/	Time(s)	Analysis Date/	Time(s)
EPA 300.0	01/13/15		12/17/14	09:44	12/17/14 14:45	
EPA 310.2	12/30/14		12/26/14	10:07	12/26/14 12:00	
EPA 350.1	01/13/15		12/19/14	09:26	12/19/14 13:16	
EPA 6010C	06/14/15		12/23/14	14:27	12/24/14 14:29	
SM 2130B-2001	12/18/14 10:00		12/17/14	18:24	12/17/14 18:24	
SM 5310B-2000	01/13/15		12/22/14	12:18	12/22/14 14:31	
Client ID: SR-1555		Lab ID:	C416681-01RE1	Sampled:	12/16/14 10:00	Received: 12/16/14 15:42
<u>Parameter</u>	Hold Date/Time(s)		Prep Date/	Time(s)	Analysis Date/	Time(s)
EPA 6010C	06/14/15		12/23/14	14:27	12/29/14 10:59	
Client ID: SR-1555 Dissolved		Lab ID:	C416681-02	Sampled:	12/16/14 10:00	Received: 12/16/14 15:42
<u>Parameter</u>	Hold Date/Time(s)		Prep Date/	Time(s)	Analysis Date/	Time(s)
EPA 6010C	06/14/15		12/23/14	14:27	12/24/14 14:33	



# **SAMPLE DETECTION SUMMARY**

Client ID: SR-1555			Lab ID:	C416681-01			
<u>Analyte</u>	<u>Results</u>	<u>Flag</u>	<u>MDL</u>	<u>PQL</u>	<u>Units</u>	<u>Method</u>	<u>Notes</u>
Chloride	6.1		2.2	5.0	mg/L	EPA 300.0	
Magnesium - Total	2030		23.0	100	ug/L	EPA 6010C	
Potassium - Total	2880		150	500	ug/L	EPA 6010C	
Sodium - Total	6910		400	500	ug/L	EPA 6010C	
Sulfate as SO4	4.0	J	2.9	5.0	mg/L	EPA 300.0	
Total Alkalinity as CaCO3	20		14	15	mg/L	EPA 310.2	
Total Organic Carbon - Dissolved	4.2		0.32	1.0	mg/L	SM 5310B-2000	
Turbidity	1.5		0.50	1.0	NTU	SM 2130B-2001	
Client ID: SR-1555			Lab ID:	C416681-01RE1			
<u>Analyte</u>	<u>Results</u>	<u>Flag</u>	<u>MDL</u>	<u>PQL</u>	<u>Units</u>	<u>Method</u>	<u>Notes</u>
Calcium - Total	5940		39.0	100	ug/L	EPA 6010C	



### **ANALYTICAL RESULTS**

**Description:** SR-1555 **Lab Sample ID:** C416681-01 **Received:** 12/16/14 15:42

**Matrix:** Water **Sampled:** 12/16/14 10:00 **Work Order:** C416681

**Project:** Swift Creek Water Quality Sampled By: Nancy Scott

# Metals (total recoverable) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Cadmium [7440-43-9]^	ND		ug/L	1	0.360	1.00	4L23025	EPA 6010C	12/24/14 14:29	VLO	
Calcium [7440-70-2]^	5940		ug/L	1	39.0	100	4L23025	EPA 6010C	12/29/14 10:59	VLO	
Copper [7440-50-8]^	ND		ug/L	1	1.60	10.0	4L23025	EPA 6010C	12/24/14 14:29	VLO	
Lead [7439-92-1]^	ND		ug/L	1	2.10	10.0	4L23025	EPA 6010C	12/24/14 14:29	VLO	
Magnesium [7439-95-4]^	2030		ug/L	1	23.0	100	4L23025	EPA 6010C	12/24/14 14:29	VLO	
Nickel [7440-02-0]^	ND		ug/L	1	1.80	10.0	4L23025	EPA 6010C	12/24/14 14:29	VLO	
Potassium [7440-09-7]^	2880		ug/L	1	150	500	4L23025	EPA 6010C	12/24/14 14:29	VLO	
Sodium [7440-23-5]^	6910		ug/L	1	400	500	4L23025	EPA 6010C	12/24/14 14:29	VLO	
Zinc [7440-66-6]^	ND		ug/L	1	3.80	10.0	4L23025	EPA 6010C	12/24/14 14:29	VLO	

# Metals (Dissolved) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	<u>MDL</u>	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	<u>Ву</u>	<u>Notes</u>
Copper [7440-50-8]^	ND		ua/l	1	1.60	10.0	41 23025	FPA 6010C	12/24/14 14:29	VLO	

# **Classical Chemistry Parameters**

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Ammonia as N [7664-41-7]^	ND		mg/L	1	0.045	0.10	4L19023	EPA 350.1	12/19/14 13:16	AJB	
Chloride [16887-00-6]^	6.1		mg/L	1	2.2	5.0	4L17013	EPA 300.0	12/17/14 14:45	AJB	
Sulfate as SO4 [14808-79-8]^	4.0	J	mg/L	1	2.9	5.0	4L17013	EPA 300.0	12/17/14 14:45	AJB	
Total Alkalinity as CaCO3 [471-34-1]^	20		mg/L	1	14	15	4L26014	EPA 310.2	12/26/14 12:00	SHA	
Turbidity^	1.5		NTU	1	0.50	1.0	4L17045	SM 2130B-2001	12/17/14 18:24	JOC	

# **Classical Chemistry Parameters (Dissolved)**

^ - ENCO Orlando certified analyte [NC 424]

Analyte [CAS Number] **Results** <u>Flag</u> <u>Units</u> <u>DF</u> <u>MDL</u> <u>PQL</u> **Batch Method** <u>Analyzed</u> By **Notes** Total Organic Carbon^ 4.2 mg/L 0.32 1.0 4L22035 SM 5310B-2000 12/22/14 14:31 **RSA** 

**Description:** SR-1555 Dissolved **Lab Sample ID:** C416681-02 **Received:** 12/16/14 15:42

**Matrix:** Water **Sampled:** 12/16/14 10:00 **Work Order:** C416681

Project: Swift Creek Water Quality Sampled By: Nancy Scott

# Metals (Dissolved) by EPA 6000/7000 Series Methods

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Copper [7440-50-8]^	ND		ua/l	1	1 60	10.0	41 23025	FPA 6010C	12/24/14 14:33	VIO	



# Metals (total recoverable) by EPA 6000/7000 Series Methods - Quality Control

### Batch 4L23025 - EPA 3005A

Blank (4L23025-BLK1)	Prepared: 12/23/2014 14:27 Analyzed: 12/24/2014 13:20

<u>Analyte</u>	Result	Flag	POL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Cadmium	0.360	U	1.00	ug/L							
Copper	1.60	U	10.0	ug/L							
Lead	2.10	U	10.0	ug/L							
Magnesium	23.0	U	100	ug/L							
Nickel	1.80	U	10.0	ug/L							
Potassium	150	U	500	ug/L							
Sodium	400	U	500	ug/L							
Zinc	3.80	U	10.0	ug/L							

Blank (4L23025-BLK3) Prepared: 12/23/2014 14:27 Analyzed: 12/29/2014 10:36

Analyte	Result	Flag	<u>POL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Cadmium	0.360	U	1.00	ug/L							
Calcium	39.0	U	100	ug/L							
Copper	1.60	U	10.0	ug/L							
Lead	2.10	U	10.0	ug/L							
Magnesium	23.0	U	100	ug/L							
Nickel	1.80	U	10.0	ug/L							
Potassium	150	U	500	ug/L							
Sodium	400	U	500	ug/L							
Zinc	3.80	U	10.0	ug/L							
LCS (4L23025-BS1)					Prepare	ed: 12/23/201	4 14:27 Anal	yzed: 12/24/2	2014 13:25		

Analyte	Result	Flag	POL	Units	Spike Level	Source	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Allalyte	Result	гач	PQL	Oilits	Levei	<u>Result</u>	70REC	LIIIILS	KPD	LIIIIL	Notes
Cadmium	22.3		1.00	ug/L	20.0		111	80-120			
Copper	206		10.0	ug/L	200		103	80-120			
Lead	213		10.0	ug/L	200		107	80-120			
Magnesium	2070		100	ug/L	2000		104	80-120			
Nickel	221		10.0	ug/L	200		110	80-120			
Potassium	10300		500	ug/L	10000		103	80-120			
Sodium	10400		500	ug/L	10000		104	80-120			
Zinc	222		10.0	ug/L	200		111	80-120			

LCS (4L23025-BS2) Prepared: 12/23/2014 14:27 Analyzed: 12/29/2014 10:39

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Cadmium	20.9		1.00	ug/L	20.0	Result	104	80-120		<del></del>	
Calcium	2090		100	ug/L	2000		105	80-120			
Copper	195		10.0	ug/L	200		97	80-120			
Lead	199		10.0	ug/L	200		99	80-120			
Magnesium	1990		100	ug/L	2000		100	80-120			
Nickel	206		10.0	ug/L	200		103	80-120			
Potassium	10100		500	ug/L	10000		101	80-120			
Sodium	10300		500	ug/L	10000		103	80-120			
Zinc	208		10.0	ug/L	200		104	80-120			



# Metals (total recoverable) by EPA 6000/7000 Series Methods - Quality Control

### Batch 4L23025 - EPA 3005A - Continued

Matrix Spike (4L23025-MS1)		Prepared: 12/23/2014 14:27 Analyzed: 12/24/2014 13:30											
Source: C415919-03													
Analyte	Result	Flag	POL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes		
Cadmium	21.3		1.00	ug/L	20.0	0.360 U	107	75-125					
Copper	203		10.0	ug/L	200	1.60 U	102	75-125					
Lead	207		10.0	ug/L	200	2.10 U	103	75-125					
Magnesium	6150		100	ug/L	2000	4750	70	75-125			QM-05		

Nickel 221 10.0 ug/L 200 8.89 106 75-125 11700 500 10000 1790 75-125 Potassium ug/L 99 Sodium 45500 10000 40500 75-125 500 ug/L 51 QM-05 Zinc 246 10.0 ug/L 200 32.2 107 75-125

Matrix Spike (4L23025-MS2) Prepared: 12/23/2014 14:27 Analyzed: 12/29/2014 10:44

Source: C415919-03

					Spike	Source		%REC		RPD	
<u>Analyte</u>	Result	Flag	<u>PQL</u>	<u>Units</u>	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	<u>Notes</u>
Cadmium	20.8		1.00	ug/L	20.0	0.360 U	104	75-125			
Calcium	4840		100	ug/L	2000	3140	85	75-125			
Copper	196		10.0	ug/L	200	1.60 U	98	75-125			
Lead	198		10.0	ug/L	200	2.10 U	99	75-125			
Magnesium	5990		100	ug/L	2000	4750	62	75-125			QM-05
Nickel	215		10.0	ug/L	200	8.89	103	75-125			
Potassium	11900		500	ug/L	10000	1790	102	75-125			
Sodium	46700		500	ug/L	10000	40500	62	75-125			QM-05
Zinc	238		10.0	ug/L	200	32.2	103	75-125			

Matrix Spike Dup (4L23025-MSD1) Prepared: 12/23/2014 14:27 Analyzed: 12/24/2014 13:33

Source: C415919-03

					Spike	Source		%REC		RPD	
Analyte	Result	Flag	PQL	Units	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	<u>Notes</u>
Cadmium	21.5		1.00	ug/L	20.0	0.360 U	108	75-125	0.9	20	
Copper	205		10.0	ug/L	200	1.60 U	103	75-125	1	20	
Lead	208		10.0	ug/L	200	2.10 U	104	75-125	0.7	20	
Magnesium	6460		100	ug/L	2000	4750	85	75-125	5	20	
Nickel	223		10.0	ug/L	200	8.89	107	75-125	0.7	20	
Potassium	12000		500	ug/L	10000	1790	102	75-125	3	20	
Sodium	47500		500	ug/L	10000	40500	70	75-125	4	20	QM-05
Zinc	247		10.0	ug/L	200	32.2	107	75-125	0.5	20	

Matrix Spike Dup (4L23025-MSD2) Prepared: 12/23/2014 14:27 Analyzed: 12/29/2014 10:46

Source: C415919-03

Analyte	Result	Flag	POL	Units	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Cadmium	20.6		1.00	ug/L	20.0	0.360 U	103	75-125	0.7	20	
Calcium	4860		100	ug/L	2000	3140	86	75-125	0.4	20	
Copper	196		10.0	ug/L	200	1.60 U	98	75-125	0.005	20	
Lead	198		10.0	ug/L	200	2.10 U	99	75-125	0.1	20	
Magnesium	6190		100	ug/L	2000	4750	72	75-125	3	20	QM-05
Nickel	214		10.0	ug/L	200	8.89	103	75-125	0.3	20	
Potassium	11800		500	ug/L	10000	1790	100	75-125	2	20	
Sodium	46700		500	ug/L	10000	40500	62	75-125	0.2	20	QM-05
Zinc	238		10.0	ug/L	200	32.2	103	75-125	0.04	20	



Metals (total recoverable) by FPA 6000/7000 Series Methods - Quality Control
Metals (foral recoverable) by FPA budu//uuu Series Methods - Ullality Confrol

Batch 4I 23025 - FPA 3005A - Continue	Ratch	41 23025 -	FPA 3005A	- Continued
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Post Spike (4L23025-PS1)					Prepare	ed: 12/23/2014	l 14:27 Anal	yzed: 12/24/2	2014 13:35		
Source: C415919-03											
Analyte	Result	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Cadmium	0.0211		0.00100	mg/L	0.0200	0.000120	105	80-120			
Copper	0.202		0.0100	mg/L	0.200	0.000714	100	80-120			
Lead	0.205		0.0100	mg/L	0.200	-2.00E-5	102	80-120			
Magnesium	6.34		0.100	mg/L	2.00	4.75	80	80-120			
Nickel	0.219		0.0100	mg/L	0.200	0.00889	105	80-120			
Potassium	12.0		0.500	mg/L	10.0	1.79	102	80-120			
Sodium	47.5		0.500	mg/L	10.0	40.5	70	80-120			QM-08
Zinc	0.245		0.0100	mg/L	0.200	0.0322	106	80-120			
Post Spike (4L23025-PS2)					Prepare	ed: 12/23/2014	l 14:27 Anal	yzed: 12/29/2	2014 10:49		
Source: C415919-03											
					Spike	Source		%REC		RPD	
<u>Analyte</u>	Result	Flag	<u>PQL</u>	<u>Units</u>	Level	Result	%REC	<u>Limits</u>	RPD	<u>Limit</u>	<u>Notes</u>
Cadmium	0.0216		0.00100	mg/L	0.0200	0.000120	108	80-120			
Calcium	5.37		0.100	mg/L	2.00	3.14	112	80-120			
Copper	0.212		0.0100	mg/L	0.200	0.000714	105	80-120			
Lead	0.207		0.0100	mg/L	0.200	-2.00E-5	104	80-120			

mg/L

mg/L

mg/L

mg/L

mg/L

2.00

0.200

10.0

10.0

0.200

4.75

0.00889

1.79

40.5

0.0322

95

108

110

109

110

80-120

80-120

80-120

80-120

80-120

# Metals (Dissolved) by EPA 6000/7000 Series Methods - Quality Control

6.65

0.225

12.8

51.3

0.252

0.100

0.0100

0.500

0.500

0.0100

### Batch 4L23025 - EPA 3005A

Magnesium

Potassium

Sodium

Zinc

Nickel

	Blank (4L23025-BLK1)					Prepare	ed: 12/23/201	4 14:27 Anal	yzed: 12/24/	2014 13:20		
<b>Ana</b>		<b>Result</b> 1.60	<u>Flaq</u> U	<b>POL</b> 10.0	<u>Units</u> ug/L	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	<u>Notes</u>
	Blank (4L23025-BLK2)					Prepare	ed: 12/23/201	4 14:27 Anal	yzed: 12/24/	2014 13:23		
<b>Ana</b>		<b>Result</b> 1.60	<b>Flag</b> U	<b>POL</b> 10.0	<u>Units</u> ug/L	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
	LCS (4L23025-BS1)					Prepare	ed: 12/23/201	4 14:27 Anal	yzed: 12/24/	2014 13:25		
<b>Ana</b> Copp	<b>livte</b> per	Result 206	Flag	<b>POL</b> 10.0	<b>Units</b> ug/L	Spike Level 200	Source <u>Result</u>	<b>%REC</b> 103	%REC <u>Limits</u> 80-120	RPD	RPD <u>Limit</u>	Notes
	Matrix Spike (4L23025-MS1)					Prepare	ed: 12/23/201	4 14:27 Anal	yzed: 12/24/	2014 13:30		
<b>Ana</b> Copp		<b>Result</b> 203	<u>Flaq</u>	<b>POL</b> 10.0	<u>Units</u> ug/L	Spike Level 200	Source Result 1.60 U	<b>%REC</b> 102	<b>%REC</b> <u>Limits</u> 75-125	RPD	RPD <u>Limit</u>	<u>Notes</u>



Batch 4L23025 - EPA 3005A	- Continued										
Matrix Spike Dup (4L23025-MS	D1)				Prepar	ed: 12/23/201	4 14:27 Anal	vzed: 12/24/	2014 13:33		
Source: C415919-03	,					, ,,		, , ,			
<u>Inalyte</u>	Result	Flag	POL	Units	Spike	Source	0/ DEC	%REC	DDD	RPD	Nati
opper	205	riay	10.0	ug/L	Level 200	<u>Result</u> 1.60 U	<b>%REC</b> 103	<u>Limits</u> 75-125	RPD 1	<u>Limit</u> 20	Note
Post Spike (4L23025-PS1)	203		10.0	ug/L		ed: 12/23/201				20	
Source: C415919-03					Перап	eu. 12/25/201	7 17.27 Andi	yzeu. 12/24/	2014 13.33		
30uice. C413919-03					Spike	Source		%REC		RPD	
<u> Analyte</u>	Result	Flag	POL	<u>Units</u>	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Not
opper	0.202		0.0100	mg/L	0.200	0.000714	100	80-120			
assical Chemistry Parameters -	Quality Con	trol									
Batch 4L17013 - NO PREP											
Blank (4L17013-BLK1)					Prepar	ed: 12/17/201	4 09:44 Anal	yzed: 12/17/	2014 11:04		
					Spike	Source		%REC		RPD	
<u>Analyte</u>	<u>Result</u>	Flag	<u>PQL</u>	<u>Units</u>	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	<u>Not</u>
nloride	2.2	U	5.0	mg/L							
ulfate as SO4	2.9	U	5.0	mg/L							
LCS (4L17013-BS1)					Prepar	ed: 12/17/201	4 09:44 Anal	yzed: 12/17/	2014 11:21		
			201		Spike	Source		%REC		RPD	
<u>inalyte</u>	Result	<u>Flaq</u>	<u>PQL</u>	<u>Units</u>	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Not
hloride ulfate as SO4	48 47		5.0 5.0	mg/L mg/L	50.0 50.0		95 94	90-110 90-110			
Matrix Spike (4L17013-MS1)	17		3.0	mg/ L		ed: 12/17/201			2014 13:37		
Source: C414995-01					Перин	ca. 12/17/201	1 03.11741101	y2ca. 12/17/	201113.37		
					Spike	Source		%REC		RPD	
<u>Analyte</u>	Result	<u>Flaq</u>	<u>PQL</u>	<u>Units</u>	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Not
hloride ulfate as SO4	23 32		5.0 5.0	mg/L mg/L	20.0 20.0	5.4 13	89 91	90-110 90-110			QM-
Matrix Spike Dup (4L17013-MS			5.0	IIIg/L		ed: 12/17/201			2014 12:54		
Source: C414995-01	<b>51</b> )				Перан	ed. 12/17/201	T 03.TT Allai	yzeu. 12/17/	2014 13.34		
<u>Inalyte</u>	Result	<u>Flag</u>	<u>PQL</u>	<u>Units</u>	Spike Level	Source Result	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Not
hloride	23		5.0	mg/L	20.0	5.4	87	90-110	2	10	QM-
ulfate as SO4	31		5.0	mg/L	20.0	13	89	90-110	1	10	QM
Batch 4L17045 - NO PREP											
Blank (4L17045-BLK1)					Prepar	ed & Analyzed	: 12/17/2014	18:24			
					Spike	Source		%REC		RPD	
<u>Analyte</u>	Result	<u>Flaq</u>	PQL	<u>Units</u>	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Not
urbidity	0.50	U	1.0	NTU							
LCS (4L17045-BS1)					Prepar	ed & Analyzed	: 12/17/2014	18:24			
Analyte	Result	<u>Flag</u>	<u>PQL</u>	<u>Units</u>	Spike Level	Source	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	



Classical Chemistry Parameters -	Quality Con	trol									
Batch 4L17045 - NO PREP - C	Continued										
Duplicate (4L17045-DUP1)					Prepare	ed & Analyzed	: 12/17/2014	1 18:24			
Source: C414671-01						_		0/ DEC			
<u>Analyte</u>	Result	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Turbidity	3.1		1.0	NTU		3.1			1	25	
Duplicate (4L17045-DUP2)					Prepare	ed & Analyzed	: 12/17/2014	1 18:24			
Source: C414671-02											
Analyte	Result	Flag	PQL	<u>Units</u>	Spike Level	Source	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Turbidity	6.6	<u>i iuq</u>	1.0	<u>omes</u> NTU	Level	Result 6.7	70REC	LIIIILS	2	25	Notes
Batch 4L19023 - NO PREP	0.0		2.0			<b></b>			_		
Blank (4L19023-BLK1)					Prepare	ed: 12/19/201	4 09:26 Ana	yzed: 12/19/	2014 12:22		
Analyte	Result	Flag	POL	Units	Spike	Source	0/ DEC	%REC	DDD	RPD	Notes
Ammonia as N	0.045	U	0.10	mg/L	Level	Result	%REC	<u>Limits</u>	RPD	<u>Limit</u>	<u>Notes</u>
LCS (4L19023-BS1)	0.043	0	0.10	IIIg/L	Prenare	ed: 12/19/201	4 09·26 Ana	vzed: 12/19/	2014 12:24		
100 (1117013 201)					Перин	ca. 12/15/201	1 03.20 7 11 10	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	201112121		
					Spike	Source		%REC		RPD	
<u>Analyte</u>	<u>Result</u>	Flag	<u>PQL</u>	<u>Units</u>	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Notes
Ammonia as N	0.92		0.10	mg/L	0.997		92	90-110			
Matrix Spike (4L19023-MS1)					Prepare	ed: 12/19/201	4 09:26 Ana	yzed: 12/19/	2014 12:28		
Source: C406162-01						_					
<u>Analyte</u>	Result	Flag	POL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Ammonia as N	0.36		0.10	mg/L	0.387	0.045 U	94	90-110			
Matrix Spike Dup (4L19023-MSI	01)				Prepare	ed: 12/19/201	4 09:26 Ana	yzed: 12/19/	2014 12:30		
Source: C406162-01											
Aughdo	Dogult	Fla.	DOL	Unite	Spike	Source	0/ PEC	%REC	DDD	RPD	BI - 4
Analyte Ammonia as N	Result 0.37	Flag	<b>POL</b> 0.10	<b>Units</b> mg/L	<b>Level</b> 0.387	<u><b>Result</b></u> 0.045 U	<b>%REC</b> 96	<u>Limits</u> 90-110	<b>RPD</b> 2	<u>Limit</u> 10	<u>Notes</u>
Batch 4L26014 - NO PREP	0.57		0.10	mg/L	0.307	0.043 0	30	30-110	2	10	
Blank (4L26014-BLK1)					Prepare	ed: 12/26/201	4 10:07 Ana	yzea: 12/26/	2014 11:38		
<u>Analyte</u>	Result	<u>Flaq</u>	POL	<u>Units</u>	Spike	Source	0/ BEC	%REC	DDD	RPD	Not-
Total Alkalinity as CaCO3	14	<u>riau</u> U	15	mg/L	Level	Result	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Notes
LCS (4L26014-BS1)			15	mg/ L	Prepare	ed: 12/26/201	4 10:07 Ana	vzed: 12/26/	2014 11:38		
100 (1110011 201)					Перих	20. 12/20/201	1 10.07 7 11 10	1,2001 12,207	2011 11:50		
					Spike	Source		%REC		RPD	
Analyte	Result	<u>Flaq</u>	<u>PQL</u>	<u>Units</u>	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	<u>Notes</u>
Total Alkalinity as CaCO3	99		15	mg/L	100	- 4. 12/20/22:	99	80-120	2014 11 12		
Matrix Spike (4L26014-MS1)					Prepare	ed: 12/26/201	4 10:0/ Ana	yzea: 12/26/	ZU14 11:40		
Source: C415213-03					Spike	Source		%REC		RPD	
Analyte	Result	Flag	POL	Units	Level	Result	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Notes
Total Alkalinity as CaCO3	560		75	mg/L	200	320	121	80-120			QM-05



Classical Chemistry Parameters	- Quality Con	trol									
Batch 4L26014 - NO PREP											
Matrix Spike Dup (4L26014-N	(SD1)				Prepare	ed: 12/26/201	4 10:07 Anal	yzed: 12/26/	2014 11:41		
Source: C415213-03											
Analyte	Result	Flag	PQL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Note
Total Alkalinity as CaCO3	540		75	mg/L	200	320	109	80-120	5	25	
Classical Chemistry Parameters	(Dissolved) -	Quality	Control								
Batch 4L22035 - NO PREP											
Blank (4L22035-BLK1)					Prepare	ed: 12/22/201	4 12:18 Anal	lyzed: 12/22/	2014 14:31		
					Spike	Source		%REC		RPD	
Analyte	Result	Flag	PQL	Units	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Note
Total Organic Carbon	0.32	U	1.0	mg/L							
LCS (4L22035-BS1)					Prepare	ed: 12/22/201	4 12:18 Anal	yzed: 12/22/	2014 14:31		
<u>Analyte</u>	<u>Result</u>	<u>Flaq</u>	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	<u>Note</u>
Total Organic Carbon	37		1.0	mg/L	40.0		92	85-115			
Matrix Spike (4L22035-MS1)					Prepare	ed: 12/22/201	4 12:18 Anal	yzed: 12/22/	2014 14:31		
Source: A407446-01					Spike	Source		%REC		RPD	
Analyte	Result	Flag	<u>PQL</u>	<u>Units</u>	Level	Result	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Note
Total Organic Carbon	42		1.0	mg/L	40.0	0.32 U	106	85-115			
Matrix Spike (4L22035-MS2)					Prepare	ed: 12/22/201	4 12:18 Anal	yzed: 12/22/	2014 14:31		
Source: A407540-03											
Analyte	Result	Flag	PQL	Units	Spike Level	Source <u>Result</u>	%REC	%REC Limits	RPD	RPD Limit	Note
Total Organic Carbon	42		1.0	mg/L	40.0	0.32 U	106	85-115			
Matrix Spike Dup (4L22035-N	(SD1)				Prepare	ed: 12/22/201	4 12:18 Anal	yzed: 12/22/	2014 14:31		
Source: A407446-01											
Australia	DIt	FI	DOL	11	Spike	Source		%REC		RPD	
Analyte Total Organic Carbon	Result 40	<u>Flaq</u>	<u>PQL</u> 1.0	<u>Units</u>	<b>Level</b> 40.0	<u><b>Result</b></u> 0.32 U	%REC 100	<u>Limits</u> 85-115	<b>RPD</b> 6	<u>Limit</u> 21	<u>Note</u>
Matrix Spike Dup (4L22035-N			1.0	mg/L		ed: 12/22/201				21	
Source: A407540-03					перап	Cu. 12/22/201	. 12.10 Allai	,.cu. 12/22/	2011 17.31		
<u>Analyte</u>	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Note
						<u>resuit</u>	, UNEC	1163	<b>D</b>		11066



### **FLAGS/NOTES AND DEFINITIONS**

- **B** The analyte was detected in the associated method blank.
- **D** The sample was analyzed at dilution.
- The reported value is between the laboratory method detection limit (MDL) and the laboratory method reporting limit (MRL), adjusted for actual sample preparation data and moisture content, where applicable.
- **U** The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
- **E** The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate.
- MRL Method Reporting Limit. The MRL is roughly equivalent to the practical quantitation limit (PQL) and is based on the low point of the calibration curve, when applicable, sample preparation factor, dilution factor, and, in the case of soil samples, moisture content.
- **ND** The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
- **N** The analysis indicates the presence of an analyte for which there is presumptive evidence (85% or greater confidence) to make a "tentative identification".
- **P** Greater than 25% concentration difference was observed between the primary and secondary GC column. The lower concentration is reported.
- **QM-05** The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.
- **QM-08** Post-digestion spike did not meet method requirements due to confirmed matrix effects (dilution test).

# ENVIRONMENTAL CONSERVATION LABORATORIES CHAIN-OF-CUSTODY RECORD

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Hem #	SR 1555	12-16-14	leam	Cherch Carath	WA	Continues	X	X	X	X	X	X				Sample Commercia
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													250	OX.	Accep	table Unacceptable

102-A Woodwinds Industrial Court Cary NC, 27511

Phone: 919.467.3090 FAX: 919.467.3515

Friday, February 20, 2015 The Catena Group (TH015) Attn: Nancy Scott 410-B Millstone Drive Hillsborough, NC 27278

RE: Laboratory Results for

Project Number: [none], Project Name/Desc: Swift Creek Water Quality

ENCO Workorder(s): C501626

Dear Nancy Scott,

Enclosed is a copy of your laboratory report for test samples received by our laboratory on Friday, February 6, 2015.

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. Results for these procedures apply only to the samples as submitted.

The analytical results contained in this report are in compliance with NELAC standards, except as noted in the project narrative. This report shall not be reproduced except in full, without the written approval of the Laboratory.

This report contains only those analyses performed by Environmental Conservation Laboratories. Unless otherwise noted, all analyses were performed at ENCO Cary. Data from outside organizations will be reported under separate cover.

If you have any questions or require further information, please do not hesitate to contact me.

Sill Scatt

Sincerely,

Bill Scott

Project Manager

Enclosure(s)



# SAMPLE SUMMARY/LABORATORY CHRONICLE

Client ID: NC-50		Lab ID:	C501626-01	Sampled:	02/06/15 11:15	Received: 02/06/15 15:30
<u>Parameter</u>	Hold Date/Time(s)		<u>Prep Date</u>	/Time(s)	Analysis Date/	<u>/Time(s)</u>
EPA 300.0	03/06/15		02/10/15	08:50	02/10/15 12:08	:
EPA 310.2	02/20/15		02/19/15	07:58	02/19/15 11:06	i
EPA 350.1	03/06/15		02/11/15	07:06	02/11/15 09:33	:
EPA 6010C	08/05/15		02/10/15	16:04	02/11/15 11:14	+
SM 5310B-2000	03/06/15		02/20/15	10:00	02/20/15 18:10	
Client ID: NC-50		Lab ID:	C501626-02	Sampled:	02/06/15 11:15	Received: 02/06/15 15:30
<u>Parameter</u>	Hold Date/Time(s)		<u>Prep Date</u>	/Time(s)	Analysis Date/	<u>/Time(s)</u>
EPA 6010C	08/05/15		02/10/15	16:04	02/11/15 11:17	,
Client ID: SR 1555		Lab ID:	C501626-03	Sampled:	02/06/15 10:30	Received: 02/06/15 15:30
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	/Time(s)	Analysis Date/	<u>'Time(s)</u>
EPA 300.0	03/06/15		02/10/15	08:50	02/10/15 12:25	i
EPA 310.2	02/20/15		02/19/15	07:58	02/19/15 11:07	,
EPA 350.1	03/06/15		02/11/15	07:06	02/11/15 09:35	i
EPA 6010C	08/05/15		02/10/15	16:04	02/11/15 11:19	1
SM 5310B-2000	03/06/15		02/20/15	10:00	02/20/15 18:10	
Client ID: SR 1555		Lab ID:	C501626-04	Sampled:	02/06/15 10:30	Received: 02/06/15 15:30
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	/Time(s)	Analysis Date/	<u>'Time(s)</u>
EPA 6010C	08/05/15		02/10/15	16:04	02/11/15 11:22	
Client ID: NC 210		Lab ID:	C501626-05	Sampled:	02/06/15 09:45	Received: 02/06/15 15:30
<u>Parameter</u>	Hold Date/Time(s)		<u>Prep Date</u>	/Time(s)	Analysis Date/	<u>/Time(s)</u>
EPA 300.0	03/06/15		02/10/15	08:50	02/10/15 12:42	!
EPA 310.2	02/20/15		02/19/15	07:58	02/19/15 11:10	
EPA 350.1	03/06/15		02/11/15	07:06	02/11/15 09:37	•
EPA 6010C	08/05/15		02/10/15	16:04	02/11/15 11:24	i e
SM 5310B-2000	03/06/15		02/20/15	10:00	02/20/15 18:10	
Client ID: NC 210		Lab ID:	C501626-06	Sampled:	02/06/15 09:45	Received: 02/06/15 15:30
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	/Time(s)	Analysis Date/	Time(s)
EPA 6010C	08/05/15		02/10/15	16:04	02/11/15 11:27	,



# **SAMPLE DETECTION SUMMARY**

Client ID: NC-50			Lab ID:	C501626-01			
<u>Analyte</u>	Results	<u>Flag</u>	MDL	<u>PQL</u>	<u>Units</u>	<u>Method</u>	Notes
Calcium - Total	5010		39.0	100	ug/L	EPA 6010C	
Chloride	4.9	J	2.2	5.0	mg/L	EPA 300.0	
Copper - Total	2.46	J	1.60	10.0	ug/L	EPA 6010C	
Magnesium - Total	1740		23.0	100	ug/L	EPA 6010C	
Potassium - Total	2420		150	500	ug/L	EPA 6010C	
Sodium - Total	4290		400	500	ug/L	EPA 6010C	
Sulfate as SO4	4.5	J	2.9	5.0	mg/L	EPA 300.0	
Total Alkalinity as CaCO3	20		14	15	mg/L	EPA 310.2	
Total Organic Carbon - Dissolved	5.1		0.32	1.0	mg/L	SM 5310B-2000	
Client ID: NC-50			Lab ID:	C501626-02			
<u>Analyte</u>	<u>Results</u>	<u>Flag</u>	<u>MDL</u>	<u>PQL</u>	<u>Units</u>	<u>Method</u>	Notes
Copper - Dissolved	2.24	J	1.60	10.0	ug/L	EPA 6010C	
Client ID: SR 1555			Lab ID:	C501626-03			
<u>Analyte</u>	<u>Results</u>	<u>Flag</u>	<u>MDL</u>	<u>PQL</u>	<u>Units</u>	<u>Method</u>	<u>Note</u> :
Calcium - Total	5170		39.0	100	ug/L	EPA 6010C	
Chloride	5.3		2.2	5.0	mg/L	EPA 300.0	
Copper - Total	2.75	J	1.60	10.0	ug/L	EPA 6010C	
Magnesium - Total	1820		23.0	100	ug/L	EPA 6010C	
Potassium - Total	2190		150	500	ug/L	EPA 6010C	
Sodium - Total	5500		400	500	ug/L	EPA 6010C	
Sulfate as SO4	4.4	J	2.9	5.0	mg/L	EPA 300.0	
Total Alkalinity as CaCO3	22		14	15	mg/L	EPA 310.2	
Total Organic Carbon - Dissolved	4.3		0.32	1.0	mg/L	SM 5310B-2000	
Client ID: NC 210			Lab ID:	C501626-05			
<u>Analyte</u>	<u>Results</u>	<u>Flag</u>	<u>MDL</u>	<u>PQL</u>	<u>Units</u>	<u>Method</u>	Notes
Calcium - Total	5050		39.0	100	ug/L	EPA 6010C	
Chloride	6.0		2.2	5.0	mg/L	EPA 300.0	
Magnesium - Total	1950		23.0	100	ug/L	EPA 6010C	
Potassium - Total	2110		150	500	ug/L	EPA 6010C	
Sodium - Total	5390		400	500	ug/L	EPA 6010C	
Sulfate as SO4	4.6	J	2.9	5.0	mg/L	EPA 300.0	
Total Alkalinity as CaCO3	22		14	15	mg/L	EPA 310.2	
Total Organic Carbon - Dissolved	4.4		0.32	1.0	mg/L	SM 5310B-2000	



Work Order: C501626

### **ANALYTICAL RESULTS**

**Description:** NC-50 **Lab Sample ID:** C501626-01 **Received:** 02/06/15 15:30

**Matrix:** Water **Sampled:** 02/06/15 11:15

**Project:** Swift Creek Water Quality Sampled By: Nancy Scott

# Metals (total recoverable) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	<u>Flag</u>	<u>Units</u>	<u>DF</u>	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Cadmium [7440-43-9]^	ND		ug/L	1	0.360	1.00	5B10032	EPA 6010C	02/11/15 11:14	JDH	
Calcium [7440-70-2]^	5010		ug/L	1	39.0	100	5B10032	EPA 6010C	02/11/15 11:14	JDH	
Copper [7440-50-8]^	2.46	J	ug/L	1	1.60	10.0	5B10032	EPA 6010C	02/11/15 11:14	JDH	
Lead [7439-92-1]^	ND		ug/L	1	2.10	10.0	5B10032	EPA 6010C	02/11/15 11:14	JDH	
Magnesium [7439-95-4]^	1740		ug/L	1	23.0	100	5B10032	EPA 6010C	02/11/15 11:14	JDH	
Nickel [7440-02-0]^	ND		ug/L	1	1.80	10.0	5B10032	EPA 6010C	02/11/15 11:14	JDH	
Potassium [7440-09-7]^	2420		ug/L	1	150	500	5B10032	EPA 6010C	02/11/15 11:14	JDH	
Sodium [7440-23-5]^	4290		ug/L	1	400	500	5B10032	EPA 6010C	02/11/15 11:14	JDH	
Zinc [7440-66-6]^	ND		ug/L	1	3.80	10.0	5B10032	EPA 6010C	02/11/15 11:14	JDH	

# **Classical Chemistry Parameters**

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<b>Analyzed</b>	<u>By</u>	<u>Notes</u>
Ammonia as N [7664-41-7]^	ND		mg/L	1	0.045	0.10	5B11001	EPA 350.1	02/11/15 09:33	SHA	
Chloride [16887-00-6]^	4.9	J	mg/L	1	2.2	5.0	5B10013	EPA 300.0	02/10/15 12:08	AJB	
Sulfate as SO4 [14808-79-8]^	4.5	J	mg/L	1	2.9	5.0	5B10013	EPA 300.0	02/10/15 12:08	AJB	
Total Alkalinity as CaCO3 [471-34-1]^	20		mg/L	1	14	15	5B19002	EPA 310.2	02/19/15 11:06	AJB	

# Classical Chemistry Parameters (Dissolved)

^ - ENCO Orlando certified analyte [NC 424]

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<b>Analyzed</b>	By	<u>Notes</u>
Total Organic Carbon^	5.1		ma/l	1	0.32	1.0	5B19003	SM 5310B-2000	02/20/15 18:10	RSA	

**Description:** NC-50 **Lab Sample ID:** C501626-02 **Received:** 02/06/15 15:30

 Matrix:
 Water
 Sampled: 02/06/15 11:15
 Work Order: C501626

Project: Swift Creek Water Quality Sampled By: Nancy Scott

# Metals (Dissolved) by EPA 6000/7000 Series Methods

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Copper [7440-50-8]^	2.24	J	ug/L	1	1.60	10.0	5B10032	EPA 6010C	02/11/15 11:17	JDH	



### **ANALYTICAL RESULTS**

**Description:** SR 1555 **Lab Sample ID:** C501626-03 **Received:** 02/06/15 15:30

 Matrix:
 Water
 Sampled: 02/06/15 10:30
 Work Order: C501626

**Project:** Swift Creek Water Quality Sampled By: Nancy Scott

# Metals (total recoverable) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Cadmium [7440-43-9]^	ND		ug/L	1	0.360	1.00	5B10032	EPA 6010C	02/11/15 11:19	JDH	
Calcium [7440-70-2]^	5170		ug/L	1	39.0	100	5B10032	EPA 6010C	02/11/15 11:19	JDH	
Copper [7440-50-8]^	2.75	J	ug/L	1	1.60	10.0	5B10032	EPA 6010C	02/11/15 11:19	JDH	
Lead [7439-92-1]^	ND		ug/L	1	2.10	10.0	5B10032	EPA 6010C	02/11/15 11:19	JDH	
Magnesium [7439-95-4]^	1820		ug/L	1	23.0	100	5B10032	EPA 6010C	02/11/15 11:19	JDH	
Nickel [7440-02-0]^	ND		ug/L	1	1.80	10.0	5B10032	EPA 6010C	02/11/15 11:19	JDH	
Potassium [7440-09-7]^	2190		ug/L	1	150	500	5B10032	EPA 6010C	02/11/15 11:19	JDH	
Sodium [7440-23-5]^	5500		ug/L	1	400	500	5B10032	EPA 6010C	02/11/15 11:19	JDH	
Zinc [7440-66-6]^	ND		ug/L	1	3.80	10.0	5B10032	EPA 6010C	02/11/15 11:19	JDH	

# **Classical Chemistry Parameters**

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<b>Analyzed</b>	By	<u>Notes</u>
Ammonia as N [7664-41-7]^	ND		mg/L	1	0.045	0.10	5B11001	EPA 350.1	02/11/15 09:35	SHA	
Chloride [16887-00-6]^	5.3		mg/L	1	2.2	5.0	5B10013	EPA 300.0	02/10/15 12:25	AJB	
Sulfate as SO4 [14808-79-8]^	4.4	J	mg/L	1	2.9	5.0	5B10013	EPA 300.0	02/10/15 12:25	AJB	
Total Alkalinity as CaCO3 [471-34-1]^	22		mg/L	1	14	15	5B19002	EPA 310.2	02/19/15 11:07	AJB	

# Classical Chemistry Parameters (Dissolved)

^ - ENCO Orlando certified analyte [NC 424]

Analyte [CAS Number]	Results	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Total Organic Carbon^	4.3		ma/l	1	0.32	1.0	5B19003	SM 5310B-2000	02/20/15 18:10	RSA	

**Description:** SR 1555 **Lab Sample ID:** C501626-04 **Received:** 02/06/15 15:30

 Matrix:
 Water
 Sampled: 02/06/15 10:30
 Work Order: C501626

Project: Swift Creek Water Quality Sampled By: Nancy Scott

# Metals (Dissolved) by EPA 6000/7000 Series Methods

Analyte [CAS Number]	Results	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Copper [7440-50-8]^	ND		ug/L	1	1.60	10.0	5B10032	EPA 6010C	02/11/15 11:22	JDH	



### **ANALYTICAL RESULTS**

**Description:** NC 210 **Lab Sample ID:** C501626-05 **Received:** 02/06/15 15:30

**Matrix:** Water **Sampled:** 02/06/15 09:45 **Work Order:** C501626

Project: Swift Creek Water Quality Sampled By: Nancy Scott

# Metals (total recoverable) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Cadmium [7440-43-9]^	ND		ug/L	1	0.360	1.00	5B10032	EPA 6010C	02/11/15 11:24	JDH	
Calcium [7440-70-2]^	5050		ug/L	1	39.0	100	5B10032	EPA 6010C	02/11/15 11:24	JDH	
Copper [7440-50-8]^	ND		ug/L	1	1.60	10.0	5B10032	EPA 6010C	02/11/15 11:24	JDH	
Lead [7439-92-1]^	ND		ug/L	1	2.10	10.0	5B10032	EPA 6010C	02/11/15 11:24	JDH	
Magnesium [7439-95-4]^	1950		ug/L	1	23.0	100	5B10032	EPA 6010C	02/11/15 11:24	JDH	
Nickel [7440-02-0]^	ND		ug/L	1	1.80	10.0	5B10032	EPA 6010C	02/11/15 11:24	JDH	
Potassium [7440-09-7]^	2110		ug/L	1	150	500	5B10032	EPA 6010C	02/11/15 11:24	JDH	
Sodium [7440-23-5]^	5390		ug/L	1	400	500	5B10032	EPA 6010C	02/11/15 11:24	JDH	
Zinc [7440-66-6]^	ND		ug/L	1	3.80	10.0	5B10032	EPA 6010C	02/11/15 11:24	JDH	

# **Classical Chemistry Parameters**

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	MDL	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Ammonia as N [7664-41-7]^	ND		mg/L	1	0.045	0.10	5B11001	EPA 350.1	02/11/15 09:37	SHA	
Chloride [16887-00-6]^	6.0		mg/L	1	2.2	5.0	5B10013	EPA 300.0	02/10/15 12:42	AJB	
Sulfate as SO4 [14808-79-8]^	4.6	J	mg/L	1	2.9	5.0	5B10013	EPA 300.0	02/10/15 12:42	AJB	
Total Alkalinity as CaCO3 [471-34-1]^	22		mg/L	1	14	15	5B19002	EPA 310.2	02/19/15 11:10	AJB	

# Classical Chemistry Parameters (Dissolved)

^ - ENCO Orlando certified analyte [NC 424]

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<b>Analyzed</b>	By	<u>Notes</u>
Total Organic Carbon^	4.4		ma/l	1	0.32	1.0	5B19003	SM 5310B-2000	02/20/15 18:10	RSA	

**Description:** NC 210 **Lab Sample ID:** C501626-06 **Received:** 02/06/15 15:30

 Matrix:
 Water
 Sampled: 02/06/15 09:45
 Work Order: C501626

Project: Swift Creek Water Quality Sampled By: Nancy Scott

# Metals (Dissolved) by EPA 6000/7000 Series Methods

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Copper [7440-50-8]^	ND		ug/L	1	1.60	10.0	5B10032	EPA 6010C	02/11/15 11:27	JDH	



# Metals (total recoverable) by EPA 6000/7000 Series Methods - Quality Control

### Batch 5B10032 - EPA 3005A

Blank (5B10032-BLK1)	Prepared: 02/10/2015 16:04 Analyzed: 02/11/2015 10:07
Dialik (SD100S2-DER1)	11cpareu. 02/10/2013 10.04 Analyzeu. 02/11/2013 10.07

Analyte	Result	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Cadmium	0.360	U	1.00	ug/L							
Calcium	39.0	U	100	ug/L							
Copper	1.60	U	10.0	ug/L							
Lead	2.10	U	10.0	ug/L							
Magnesium	23.0	U	100	ug/L							
Nickel	1.80	U	10.0	ug/L							
Potassium	150	U	500	ug/L							
Sodium	400	U	500	ug/L							
Zinc	3.80	U	10.0	ug/L							

Blank (5B10032-BLK2)	Prepared: 02/10/2015 16:04 Analyzed: 02/11/2015 10:10
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					Spike	Source		%REC		RPD	
<u>Analyte</u>	Result	<u>Flag</u>	PQL	<u>Units</u>	Level	Result	%REC	<u>Limits</u>	RPD	<u>Limit</u>	<u>Notes</u>
Cadmium	0.360	ш	1.00	ua/l							

LCS (5B10032-BS1) Prepared: 02/10/2015 16:04 Analyzed: 02/11/2015 10:13

					Spike	Source		%REC		RPD	
<u>Analyte</u>	Result	<u>Flag</u>	<u>PQL</u>	<u>Units</u>	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	<u>Notes</u>
Cadmium	20.5		1.00	ug/L	20.0		103	80-120			
Calcium	2110		100	ug/L	2000		105	80-120			
Copper	198		10.0	ug/L	200		99	80-120			
Lead	211		10.0	ug/L	200		105	80-120			
Magnesium	2060		100	ug/L	2000		103	80-120			
Nickel	206		10.0	ug/L	200		103	80-120			
Potassium	9950		500	ug/L	10000		100	80-120			
Sodium	10100		500	ug/L	10000		101	80-120			
Zinc	208		10.0	ug/L	200		104	80-120			

 Matrix Spike (5B10032-MS1)
 Prepared: 02/10/2015 16:04 Analyzed: 02/11/2015 10:19

Source: C417026-01

					Spike	Source		%REC		RPD	
<u>Analyte</u>	Result	Flag	<u>PQL</u>	<u>Units</u>	Level	Result	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Notes
Cadmium	21.3		1.00	ug/L	20.0	0.360 U	106	75-125			
Calcium	38900		100	ug/L	2000	37600	65	75-125			QM-05
Copper	201		10.0	ug/L	200	1.60 U	101	75-125			
Lead	209		10.0	ug/L	200	2.10 U	105	75-125			
Magnesium	9010		100	ug/L	2000	7190	91	75-125			
Nickel	212		10.0	ug/L	200	1.80 U	106	75-125			
Potassium	13200		500	ug/L	10000	3210	100	75-125			
Sodium	24400		500	ug/L	10000	14600	98	75-125			
Zinc	241		10.0	ug/L	200	25.2	108	75-125			

 Matrix Spike Dup (5B10032-MSD1)
 Prepared: 02/10/2015 16:04 Analyzed: 02/11/2015 10:21

Source: C417026-01

					Spike	Source		%REC		RPD	
<u>Analyte</u>	<u>Result</u>	Flag	<u>PQL</u>	<u>Units</u>	Level	Result	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Notes
Cadmium	20.7		1.00	ug/L	20.0	0.360 U	104	75-125	3	20	
Calcium	39900		100	ug/L	2000	37600	112	75-125	2	20	
Copper	205		10.0	ug/L	200	1.60 U	102	75-125	2	20	
Lead	213		10.0	ug/L	200	2.10 U	106	75-125	2	20	



Batch 5B10032 - EPA 3005A - Co
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	Matrix Spike Dup (5B10032	-MSD1) Continue	d		Prepared: 02/10/2015 16:04 Analyzed: 02/11/2015 10:21										
	Source: C417026-01														
Ana	<u>lyte</u>	Result	Flag	POL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes			
Magn	esium	9420		100	ug/L	2000	7190	111	75-125	4	20				
Nicke	·l	206		10.0	ug/L	200	1.80 U	103	75-125	3	20				
Potas	ssium	13700		500	ug/L	10000	3210	105	75-125	3	20				
Sodiu	ım	25100		500	ug/L	10000	14600	105	75-125	3	20				
Zinc		235		10.0	ug/L	200	25.2	105	75-125	3	20				

Post Spike (5B10032-PS1) Prepared: 02/10/2015 16:04 Analyzed: 02/11/2015 10:24

Source: C417026-01

<u>Analyte</u>	Result	<u>Flaq</u>	<u>POL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Cadmium	0.0197		0.00100	mg/L	0.0200	0.000107	98	80-120			
Calcium	38.2		0.100	mg/L	2.00	37.6	26	80-120			QM-08
Copper	0.185		0.0100	mg/L	0.200	0.000744	92	80-120			
Lead	0.192		0.0100	mg/L	0.200	-0.00114	96	80-120			
Magnesium	8.64		0.100	mg/L	2.00	7.19	73	80-120			QM-08
Nickel	0.186		0.0100	mg/L	0.200	-0.000482	93	80-120			
Potassium	12.4		0.500	mg/L	10.0	3.21	92	80-120			
Sodium	23.3		0.500	mg/L	10.0	14.6	87	80-120			
Zinc	0.213		0.0100	mg/L	0.200	0.0252	94	80-120			

# Metals (Dissolved) by EPA 6000/7000 Series Methods - Quality Control

0.185

### Batch 5B10032 - EPA 3005A

Blank (5B10032-BLK2)					Prepare	ed: 02/10/201	5 16:04 Anal	yzed: 02/11/	2015 10:10		
<u>Analyte</u>	Result	<u>Flaq</u>	PQL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	<u>Notes</u>
Copper	1.60	U	10.0	ug/L							
LCS (5B10032-BS1)					Prepare	ed: 02/10/201	5 16:04 Anal	yzed: 02/11/	2015 10:13		
Analyte	Result	<u>Flaq</u>	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Copper	198		10.0	ug/L	200		99	80-120			
Matrix Spike (5B10032-MS1)					Prepare	ed: 02/10/201	5 16:04 Anal	yzed: 02/11/	2015 10:19		
Source: C417026-01											
Analyte	Result	Flag	PQL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Copper	201		10.0	ug/L	200	1.60 U	101	75-125			
Matrix Spike Dup (5B10032-MSI	D1)				Prepare	ed: 02/10/201	5 16:04 Anal	yzed: 02/11/	2015 10:21		
Source: C417026-01											
<u>Analyte</u>	Result	Flag	POL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Copper	205		10.0	ug/L	200	1.60 U	102	75-125	2	20	
Post Spike (5B10032-PS1)					Prepare	ed: 02/10/201	5 16:04 Anal	yzed: 02/11/	2015 10:24		
Source: C417026-01											
Analyte	Result	Flag	PQL	Units	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes

Copper

0.200

0.000744

92

80-120

mg/L

0.0100



lassical Chemistry Parameters -	Quanty Con										
Batch 5B10013 - NO PREP											
Blank (5B10013-BLK1)					Prepar	ed: 02/10/201	5 08:50 Anal	yzed: 02/10/	2015 10:11		
					Spike	Source		%REC		RPD	
nalyte	Result	Flag	PQL	Units	Level	Result	%REC	<u>Limits</u>	RPD	<u>Limit</u>	No
nloride	2.2	U	5.0	mg/L							
ulfate as SO4	2.9	U	5.0	mg/L							
LCS (5B10013-BS1)					Prepar	ed: 02/10/201	5 08:50 Anal	yzed: 02/10/	2015 10:28		
unalyte	Result	Flag	POL	<u>Units</u>	Spike Level	Source	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	No
hloride	48	<u>i iaq</u>	5.0	mg/L	50.0	<u>Result</u>	96	90-110	KPD	LIIIIL	NO
ulfate as SO4	47		5.0	mg/L	50.0		95	90-110			
Matrix Spike (5B10013-MS1)				3,		ed: 02/10/201			2015 12:59		
Source: C500553-04					Пори	04. 02/10/201	5 00100 7 11101	, 2001 02, 20,	2010 12:03		
\nalyte	Result	<u>Flag</u>	<u>PQL</u>	<u>Units</u>	Spike Level	Source	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	No
hloride	36	<u>i iuq</u>	5.0	mg/L	20.0	<u>Result</u> 17	96	90-110	KPD	Lillie	1101
ulfate as SO4	31		5.0	mg/L	20.0	13	89	90-110			QM
Matrix Spike Dup (5B10013-MSI	D1)					ed: 02/10/201	5 08:50 Anal		2015 13:49		
Source: C500553-04											
ınalyte	Result	Flag	PQL	Units	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	No
nloride	37		5.0	mg/L	20.0	17	100	90-110	2	10	
ulfate as SO4	32		5.0	mg/L	20.0	13	93	90-110	2	10	
Batch 5B11001 - NO PREP											
Blank (5B11001-BLK1)					Prepar	ed: 02/11/201	5 07:06 Anal	yzed: 02/11/	2015 08:41		
					Spike	Source		%REC		RPD	
<u>Analyte</u>	Result	Flag	<u>PQL</u>	<u>Units</u>	Level	Result	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Not
mmonia as N	0.045	U	0.10	mg/L							
LCS (5B11001-BS1)					Prepar	ed: 02/11/201	5 07:06 Anal	yzed: 02/11/	2015 08:43		
					Spike	Source		%REC		RPD	
<u>Analyte</u>	Result	Flag	<u>PQL</u>	<u>Units</u>	Level	Result	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Not
mmonia as N	0.96		0.10	mg/L	0.997		96	90-110			
Matrix Spike (5B11001-MS1)					Prepar	ed: 02/11/201	5 07:06 Anal	yzed: 02/11/	2015 08:48		
Source: C416551-01					Spike	Source		%REC		RPD	
Analyte	Result	Flag	PQL	Units	Level	Result	%REC	<u>Limits</u>	RPD	<u>Limit</u>	No
mmonia as N	18		2.0	mg/L	7.96	10	96	90-110			
Matrix Spike Dup (5B11001-MSI	01)				Prepar	ed: 02/11/201	5 07:06 Anal	yzed: 02/11/	2015 08:50		
Source: C416551-01					Cuilca	Sauras		0/- DEC		RPD	
<u>Analyte</u>	Result	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	KPD <u>Limit</u>	No
mmonia as N	18		2.0	mg/L	7.96	10	101	90-110	2	10	
Batch 5B19002 - NO PREP											
Blank (5B19002-BLK1)					Prepar	ed: 02/19/201	5 07:58 Anal	yzed: 02/19/	2015 10:48		
Analyto	Pocult	Flag	PΩI	Unite	Spike	Source	0/- DEC	%REC	DDD	RPD	

**Analyte** 

Level

%REC

<u>Result</u>

RPD

<u>Limit</u>

**Limits** 

**Units** 

<u>Flag</u>

<u>PQL</u>



Batch 5B19002 - NO PREP	- Continued										
Blank (5B19002-BLK1) Conti		Prepared: 02/19/2015 07:58 Analyzed: 02/19/2015 10:48									
<u>Analyte</u>	Result	Flag	<u>POL</u>	<u>Units</u>	Spike Level	Source Result	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Not
otal Alkalinity as CaCO3	14	U	15	mg/L							
LCS (5B19002-BS1)					Prepare	ed: 02/19/201	5 07:58 Anal	yzed: 02/19/2	2015 10:49		
Analyte	Result	<u>Flag</u>	<u>POL</u>	<u>Units</u>	Spike Level	Source Result	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Not
otal Alkalinity as CaCO3	97		15	mg/L	100	Result	97	80-120			
Matrix Spike (5B19002-MS1)	ı				Prepare	ed: 02/19/201	5 07:58 Anal	yzed: 02/19/2	2015 10:51		
Source: C501868-04											
Analyte	Result	Flag	POL	Units	Spike Level	Source	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Not
otal Alkalinity as CaCO3	710	i iaq	75	mg/L	200	<u>Result</u> 500	104	80-120	KPD	LIIIIL	NO
Matrix Spike Dup (5B19002-I			,,,	9/ _		ed: 02/19/201			2015 10:52		
Source: C501868-04					Пораго	54. 52, 13, 251	7 07 100 7 11 101	, 20d. 02, 13, .	2010 10:02		
Analyte	Result	Flag	POL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	No
	11004.10				LCVCI	Result	/UILL	Lilling	IXI D	Little	1101
otal Alkalinity as CaCO3		Quality	75 <b>Control</b>	mg/L	200	500	104	80-120	0.01	25	
otal Alkalinity as CaCO3  lassical Chemistry Parameters	s (Dissolved) -	Quality		mg/L		500 ed: 02/20/201				25	
otal Alkalinity as CaCO3  Classical Chemistry Parameters  Batch 5B19003 - NO PREP	s (Dissolved) -	Quality (		mg/L	Prepare	ed: 02/20/201		yzed: 02/20/			
otal Alkalinity as CaCO3  Classical Chemistry Parameters  Batch 5B19003 - NO PREP  Blank (5B19003-BLK1)	s (Dissolved) -	Quality (		mg/L Units						25  RPD  Limit	Not
otal Alkalinity as CaCO3  lassical Chemistry Parameters  Batch 5B19003 - NO PREP  Blank (5B19003-BLK1)  Analyte	s (Dissolved) -		Control		Prepare <b>Spike</b>	ed: 02/20/201 <b>Source</b>	5 10:00 Anal	yzed: 02/20/2	2015 18:10	RPD	Not
otal Alkalinity as CaCO3  Classical Chemistry Parameters  Batch 5B19003 - NO PREP  Blank (5B19003-BLK1)  Analyte	s (Dissolved) -	Flaq	Control	Units	Prepare Spike Level	ed: 02/20/201 <b>Source</b>	5 10:00 Anal	yzed: 02/20/2 %REC <u>Limits</u>	2015 18:10 RPD	RPD	Not
lassical Chemistry Parameters  Batch 5B19003 - NO PREP  Blank (5B19003-BLK1)  Analyte  otal Organic Carbon  LCS (5B19003-BS1)	Result 0.32	<b>Flag</b> U	POL 1.0	<b>Units</b> mg/L	Prepare Spike Level Prepare Spike	Source Result  Source Source Result	5 10:00 Anal %REC 5 10:00 Anal	%REC Limits yzed: 02/20/3	2015 18:10 <b>RPD</b> 2015 18:10	RPD <u>Limit</u>	
lassical Chemistry Parameters  Batch 5B19003 - NO PREP  Blank (5B19003-BLK1)  Analyte  otal Organic Carbon  LCS (5B19003-BS1)	Result 0.32	Flaq	POL 1.0	Units mg/L Units	Prepare  Spike Level  Prepare  Spike Level	ed: 02/20/2011  Source  Result  ed: 02/20/2011	5 10:00 Anal	%REC Limits yzed: 02/20/3	2015 18:10 RPD	RPD <u>Limit</u>	
lassical Chemistry Parameters  Batch 5B19003 - NO PREP  Blank (5B19003-BLK1)  Analyte  otal Organic Carbon  LCS (5B19003-BS1)	Result 0.32  Result 37	<b>Flag</b> U	POL 1.0	<b>Units</b> mg/L	Spike Level  Prepare  Spike Level 40.0	Source Result  Source Source Result	%REC 5 10:00 Anal	%REC Limits %REC Limits yzed: 02/20/3	2015 18:10  RPD  2015 18:10  RPD	RPD <u>Limit</u>	
Total Alkalinity as CaCO3  Classical Chemistry Parameters  Batch 5B19003 - NO PREP  Blank (5B19003-BLK1)  Analyte Total Organic Carbon  LCS (5B19003-BS1)  Analyte Total Organic Carbon	Result 0.32  Result 37	<b>Flag</b> U	POL 1.0	Units mg/L Units	Spike Level  Prepare  Spike Level 40.0	Source Result  cd: 02/20/2011  Source Result	%REC 5 10:00 Anal	%REC Limits %REC Limits yzed: 02/20/3	2015 18:10  RPD  2015 18:10  RPD	RPD <u>Limit</u>	
Cotal Alkalinity as CaCO3  Classical Chemistry Parameters  Batch 5B19003 - NO PREP  Blank (5B19003-BLK1)  Analyte  Cotal Organic Carbon  LCS (5B19003-BS1)  Analyte  Cotal Organic Carbon  Matrix Spike (5B19003-MS1)	Result 0.32  Result 37	<b>Flag</b> U	POL 1.0	Units mg/L Units	Spike Level  Prepare  Spike Level 40.0	Source Result  Source Result  Source Result  Source Result  Source Result  Source Result	%REC 5 10:00 Anal	%REC Limits  %REC Limits  yzed: 02/20/3  %REC Limits  85-115  yzed: 02/20/3	2015 18:10  RPD  2015 18:10  RPD	RPD <u>Limit</u>	Not.
Cotal Alkalinity as CaCO3  Classical Chemistry Parameters  Batch 5B19003 - NO PREP  Blank (5B19003-BLK1)  Analyte  Cotal Organic Carbon  LCS (5B19003-BS1)  Analyte  Cotal Organic Carbon  Matrix Spike (5B19003-MS1)  Source: A500757-01	Result 0.32  Result 37	Flag U Flag	POL 1.0 POL 1.0	Units mg/L Units mg/L	Prepare  Spike Level  Prepare  Spike Level  40.0  Prepare	Source Result  Source Result  Source Result  Source Result	%REC 5 10:00 Anal 6 10:00 Anal 7 %REC 93 5 10:00 Anal	%REC Limits yzed: 02/20/3 %REC Limits Elimits 85-115 yzed: 02/20/3	RPD 2015 18:10 RPD 2015 18:10 RPD	RPD <u>Limit</u> RPD <u>Limit</u>	Not
Cotal Alkalinity as CaCO3  Classical Chemistry Parameters  Batch 5B19003 - NO PREP  Blank (5B19003-BLK1)  Analyte Cotal Organic Carbon  LCS (5B19003-BS1)  Analyte Cotal Organic Carbon  Matrix Spike (5B19003-MS1)  Source: A500757-01	Result 37  Result 40	Flag U Flag	POL 1.0 POL 1.0	Units mg/L  Units mg/L	Prepare  Spike Level  40.0  Prepare  Spike Level 40.0  40.0	Source Result  Source Result  Source Result  Source Result  Source Result  Source Result	%REC 93 5 10:00 Anal	%REC Limits 85-115 %REC REC REC REC REC REC REC REC REC REC	2015 18:10  RPD  2015 18:10  RPD  2015 18:10	RPD <u>Limit</u> RPD <u>Limit</u>	Not
Cotal Alkalinity as CaCO3  Classical Chemistry Parameters  Batch 5B19003 - NO PREP  Blank (5B19003-BLK1)  Analyte Cotal Organic Carbon  LCS (5B19003-BS1)  Analyte Cotal Organic Carbon  Matrix Spike (5B19003-MS1)  Source: A500757-01  Analyte Cotal Organic Carbon	Result 37  Result 40	Flag U Flag	POL 1.0 POL 1.0	Units mg/L  Units mg/L	Prepare  Spike Level  Prepare  Spike Level  40.0  Prepare  40.0  Prepare	Source Result  Source Result  Source Result  Source Result  O.39  ed: 02/20/2011	%REC 93 5 10:00 Anal	%REC Limits  %REC Limits  yzed: 02/20/3  %REC Limits  85-115  yzed: 02/20/3  %REC Limits  85-115  yzed: 02/20/3	2015 18:10  RPD  2015 18:10  RPD  2015 18:10	RPD Limit RPD Limit	Not
lassical Chemistry Parameters  Batch 5B19003 - NO PREP  Blank (5B19003-BLK1)  Analyte  otal Organic Carbon  LCS (5B19003-BS1)  Analyte  otal Organic Carbon  Matrix Spike (5B19003-MS1)  Source: A500757-01  Analyte  otal Organic Carbon  Matrix Spike (5B19003-MS1)  Matrix Spike (5B19003-MS1)  Analyte  otal Organic Carbon	Result 37  Result 40	Flag U Flag	POL 1.0 POL 1.0	Units mg/L  Units mg/L	Prepare  Spike Level  40.0  Prepare  Spike Level 40.0  40.0	Source Result  Source Result  Source Result  Source Result  Additional content of the content of	%REC 93 5 10:00 Anal	%REC Limits 85-115 %REC REC REC REC REC REC REC REC REC REC	2015 18:10  RPD  2015 18:10  RPD  2015 18:10	RPD <u>Limit</u> RPD <u>Limit</u>	Not



### **FLAGS/NOTES AND DEFINITIONS**

- **B** The analyte was detected in the associated method blank.
- **D** The sample was analyzed at dilution.
- The reported value is between the laboratory method detection limit (MDL) and the laboratory method reporting limit (MRL), adjusted for actual sample preparation data and moisture content, where applicable.
- **U** The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
- **E** The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate.
- MRL Method Reporting Limit. The MRL is roughly equivalent to the practical quantitation limit (PQL) and is based on the low point of the calibration curve, when applicable, sample preparation factor, dilution factor, and, in the case of soil samples, moisture content.
- **ND** The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
- **N** The analysis indicates the presence of an analyte for which there is presumptive evidence (85% or greater confidence) to make a "tentative identification".
- **P** Greater than 25% concentration difference was observed between the primary and secondary GC column. The lower concentration is reported.
- **QM-05** The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.
- **QM-08** Post-digestion spike did not meet method requirements due to confirmed matrix effects (dilution test).

## ENVIRONMENTAL CONSERVATION LABORATORIES CHAIN-OF-CUSTODY RECORD 10775 Central Port Dr. 4810 Executive Park Court, Sulln 211 102-A Woodwinds Industrial Ct

www.enco	ıa	nc	com
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ent Name	tena Group		Project Number				00		7	Я	equested	Analyses				Requested Turnaround Times
Idress	i er ia crioup		Project Name/I	Desc			300		ď			JA6				Note : Rush requests subject to
410-	B Millstone Dri	ve .	Swift	Creek \	water (	a vality	310.2, Chiber		Z			Dissolve				acceptance by the facility
ty/ST/Z)p			PO # / Billing In	do *		U	7.	0	Na				-5,1			
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210	132-1300 Fax		Reporting Cont	cy Scot					Ca, Cd, Cu, K, Mg, Na, N, Pb,			SM5310B				Evendited
mpler(s) N	ame, Affiliation (Print)		Billion Contact				Alkalinity	Ammonia	77		Sulfate	10				Expedited
Na	nay Scott		Nav	Time Zone	+		3	3	7.0	7	B	SS				Due//
mpler(s) \$	onahire		Site Location /	Time Zone			고	7	9	Cu/F	3	70C			Ī	Lab Workorder
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		1	Collection		Matrix	Total # of			Preser	vation (S	ee Codes	) (Combine :	is necessary)			1000
m#	Sample ID (Field Identification)	Collection Date	Time	Comp / Grab	(see codes)	Containen										Sample Comments
111 3	VC 50	2/6/15	11:15		WA	6										
	R 1555	2/6/15	10:30		WA	6										
1	VC 210	2/0/15	9:45		WA	6										
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										1						
			Relinquist	Control Processing				Date/Tim			Received	Du				Date/Time

Unacceptable

Acceptable

102-A Woodwinds Industrial Court Cary NC, 27511

Phone: 919.467.3090 FAX: 919.467.3515

Wednesday, April 22, 2015 The Catena Group (TH015) Attn: Nancy Scott 410-B Millstone Drive Hillsborough, NC 27278

RE: Laboratory Results for

Project Number: [none], Project Name/Desc: Swift Creek Water Quality

ENCO Workorder(s): C504461

Dear Nancy Scott,

Enclosed is a copy of your laboratory report for test samples received by our laboratory on Tuesday, April 7, 2015.

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. Results for these procedures apply only to the samples as submitted.

The analytical results contained in this report are in compliance with NELAC standards, except as noted in the project narrative. This report shall not be reproduced except in full, without the written approval of the Laboratory.

This report contains only those analyses performed by Environmental Conservation Laboratories. Unless otherwise noted, all analyses were performed at ENCO Cary. Data from outside organizations will be reported under separate cover.

If you have any questions or require further information, please do not hesitate to contact me.

Sill Scatt

Sincerely,

Bill Scott

Project Manager

Enclosure(s)



### SAMPLE SUMMARY/LABORATORY CHRONICLE

Client ID: NC-50		Lab ID:	C504461-01	Sampled:	04/07/15 14:45	Received:	04/07/15 15:30
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	e/Time(s)	Analysis Date	/Time(s)	
EPA 300.0	05/05/15		04/09/15	09:53	04/10/15 18:29	)	
EPA 310.2	04/21/15		04/10/15	07:22	04/10/15 09:32	2	
EPA 350.1	05/05/15		04/10/15	10:02	04/10/15 13:16	5	
EPA 6010C	10/04/15		04/16/15	11:48	04/17/15 13:41	<u>l</u>	
SM 5310B-2000	05/05/15		04/15/15	15:00	04/15/15 20:59	)	
Client ID: NC-50		Lab ID:	C504461-02	Sampled:	04/07/15 14:45	Received:	04/07/15 15:30
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	e/Time(s)	Analysis Date	/Time(s)	
EPA 6010C	10/04/15		04/16/15	11:48	04/17/15 14:39	)	
Client ID: SR 1555		Lab ID:	C504461-03	Sampled:	04/07/15 14:15	Received:	04/07/15 15:30
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	e/Time(s)	Analysis Date	/Time(s)	
EPA 300.0	05/05/15		04/09/15	09:53	04/10/15 18:47	7	
EPA 310.2	04/21/15		04/10/15	07:22	04/10/15 09:33	3	
EPA 350.1	05/05/15		04/10/15	10:02	04/10/15 13:18	3	
EPA 6010C	10/04/15		04/16/15	11:48	04/17/15 14:42	2	
SM 5310B-2000	05/05/15		04/15/15	15:00	04/15/15 20:59	)	
Client ID: SR 1555		Lab ID:	C504461-04	Sampled:	04/07/15 14:15	Received:	04/07/15 15:30
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	/Time(s)	Analysis Date	/Time(s)	
EPA 6010C	10/04/15		04/16/15	11:48	04/17/15 14:44	1	
Client ID: NC 210		Lab ID:	C504461-05	Sampled:	04/07/15 13:45	Received:	04/07/15 15:30
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	e/Time(s)	<u>Analysis Date</u>	/Time(s)	
EPA 300.0	05/05/15		04/09/15	09:53	04/10/15 19:06	5	
EPA 310.2	04/21/15		04/10/15	07:22	04/10/15 09:34	1	
EPA 350.1	05/05/15		04/10/15	10:02	04/10/15 13:19	)	
EPA 6010C	10/04/15		04/16/15	11:48	04/17/15 14:47	7	
SM 5310B-2000	05/05/15		04/15/15	15:00	04/15/15 20:59	)	
Client ID: NC 210		Lab ID:	C504461-06	Sampled:	04/07/15 13:45	Received:	04/07/15 15:30
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	/Time(s)	Analysis Date	/Time(s)	
EPA 6010C	10/04/15		04/16/15	11:48	04/17/15 14:49	)	



### **SAMPLE DETECTION SUMMARY**

Client ID: NC-50			Lab ID:	C504461-01			
<u>Analyte</u>	<u>Results</u>	<u>Flag</u>	<u>MDL</u>	<u>PQL</u>	<u>Units</u>	<u>Method</u>	<u>Notes</u>
Calcium - Total	7000		39.0	100	ug/L	EPA 6010C	
Chloride	11		2.2	5.0	mg/L	EPA 300.0	
Copper - Total	5.91	JB	1.60	10.0	ug/L	EPA 6010C	J-01
Magnesium - Total	2290		29.0	100	ug/L	EPA 6010C	
Potassium - Total	2570		150	500	ug/L	EPA 6010C	
Sodium - Total	8620		400	500	ug/L	EPA 6010C	
Sulfate as SO4	4.9	J	2.9	5.0	mg/L	EPA 300.0	
Total Alkalinity as CaCO3	29		14	15	mg/L	EPA 310.2	
Total Organic Carbon - Dissolved	6.1		0.34	1.0	mg/L	SM 5310B-2000	
Client ID: NC-50			Lab ID:	C504461-02			
<u> Analyte</u>	<u>Results</u>	<u>Flag</u>	<u>MDL</u>	<u>PQL</u>	<u>Units</u>	<u>Method</u>	<u>Notes</u>
Copper - Dissolved	4.92	JB	1.60	10.0	ug/L	EPA 6010C	J-01
Client ID: SR 1555			Lab ID:	C504461-03			
<u> Analyte</u>	<u>Results</u>	Flag	MDL	<u>PQL</u>	<u>Units</u>	<u>Method</u>	Notes
Calcium - Total	6550		39.0	100	ug/L	EPA 6010C	
Chloride	8.3		2.2	5.0	mg/L	EPA 300.0	
Copper - Total	4.13	JB	1.60	10.0	ug/L	EPA 6010C	J-01
Magnesium - Total	2230		29.0	100	ug/L	EPA 6010C	
Potassium - Total	2330		150	500	ug/L	EPA 6010C	
Sodium - Total	8040		400	500	ug/L	EPA 6010C	
Sulfate as SO4	4.0	J	2.9	5.0	mg/L	EPA 300.0	
Fotal Alkalinity as CaCO3	30		14	15	mg/L	EPA 310.2	
Гotal Organic Carbon - Dissolved	4.8		0.34	1.0	mg/L	SM 5310B-2000	
Client ID: SR 1555			Lab ID:	C504461-04			
<u>unalyte</u>	<u>Results</u>	<u>Flag</u>	MDL	<u>PQL</u>	<u>Units</u>	<u>Method</u>	Notes
Copper - Dissolved	4.17	JB	1.60	10.0	ug/L	EPA 6010C	J-01
Client ID: NC 210			Lab ID:	C504461-05			
<u>nalyte</u>	<u>Results</u>	<u>Flag</u>	<u>MDL</u>	<u>PQL</u>	<u>Units</u>	<u>Method</u>	<u>Notes</u>
Calcium - Total	6850		39.0	100	ug/L	EPA 6010C	
Chloride	8.5		2.2	5.0	mg/L	EPA 300.0	
Copper - Total	4.65	JB	1.60	10.0	ug/L	EPA 6010C	J-01
lagnesium - Total	2660		29.0	100	ug/L	EPA 6010C	
Potassium - Total	2460		150	500	ug/L	EPA 6010C	
Sodium - Total	8460		400	500	ug/L	EPA 6010C	
Sulfate as SO4	4.2	J	2.9	5.0	mg/L	EPA 300.0	
Total Alkalinity as CaCO3	26		14	15	mg/L	EPA 310.2	
Total Organic Carbon - Dissolved	5.1		0.34	1.0	mg/L	SM 5310B-2000	
Client ID: NC 210			Lab ID:	C504461-06			
<u>Analyte</u>	<u>Results</u>	<u>Flag</u>	MDL	<u>PQL</u>	<u>Units</u>	<u>Method</u>	Notes
Copper - Dissolved	4.13	JB	1.60	10.0	ug/L	EPA 6010C	J-01



### **ANALYTICAL RESULTS**

**Description:** NC-50 **Lab Sample ID:** C504461-01 **Received:** 04/07/15 15:30

 Matrix:
 Water
 Sampled: 04/07/15 14:45
 Work Order: C504461

Project: Swift Creek Water Quality Sampled By: Nancy Scott

### Metals (total recoverable) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Cadmium [7440-43-9]^	ND		ug/L	1	0.360	1.00	5D16018	EPA 6010C	04/17/15 13:41	JDH	
Calcium [7440-70-2]^	7000		ug/L	1	39.0	100	5D16018	EPA 6010C	04/17/15 13:41	JDH	
Copper [7440-50-8]^	5.91	JB	ug/L	1	1.60	10.0	5D16018	EPA 6010C	04/17/15 13:41	JDH	J-01
Lead [7439-92-1]^	ND		ug/L	1	3.10	10.0	5D16018	EPA 6010C	04/17/15 13:41	JDH	
Magnesium [7439-95-4]^	2290		ug/L	1	29.0	100	5D16018	EPA 6010C	04/17/15 13:41	JDH	
Nickel [7440-02-0]^	ND		ug/L	1	1.80	10.0	5D16018	EPA 6010C	04/17/15 13:41	JDH	
Potassium [7440-09-7]^	2570		ug/L	1	150	500	5D16018	EPA 6010C	04/17/15 13:41	JDH	
Sodium [7440-23-5]^	8620		ug/L	1	400	500	5D16018	EPA 6010C	04/17/15 13:41	JDH	
Zinc [7440-66-6]^	ND		ug/L	1	3.80	10.0	5D16018	EPA 6010C	04/17/15 13:41	JDH	

### **Classical Chemistry Parameters**

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	<u>Flag</u>	<u>Units</u>	<u>DF</u>	MDL	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Ammonia as N [7664-41-7]^	ND		mg/L	1	0.045	0.10	5D10011	EPA 350.1	04/10/15 13:16	SHA	
Chloride [16887-00-6]^	11		mg/L	1	2.2	5.0	5D09010	EPA 300.0	04/10/15 18:29	SHA	
Sulfate as SO4 [14808-79-8]^	4.9	J	mg/L	1	2.9	5.0	5D09010	EPA 300.0	04/10/15 18:29	SHA	
Total Alkalinity as CaCO3 [471-34-1]^	29		mg/L	1	14	15	5D10001	EPA 310.2	04/10/15 09:32	SHA	

### Classical Chemistry Parameters (Dissolved)

^ - ENCO Orlando certified analyte [NC 424]

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<b>Analyzed</b>	By	<u>Notes</u>
Total Organic Carbon^	6.1		ma/l	1	0.34	1.0	5D15005	SM 5310R-2000	04/15/15 20:50	DCV	

**Description:** NC-50 **Lab Sample ID:** C504461-02 **Received:** 04/07/15 15:30

**Matrix:** Water **Sampled:** 04/07/15 14:45

Project: Swift Creek Water Quality Sampled By: Nancy Scott

### Metals (Dissolved) by EPA 6000/7000 Series Methods

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	MDL	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Conner [7440-50-8]^	4.92	1B	ua/l	1	1 60	10.0	5D16018	FPA 6010C	04/17/15 14:39	1DH	1-01



Work Order: C504461

### **ANALYTICAL RESULTS**

**Description:** SR 1555 **Lab Sample ID:** C504461-03 **Received:** 04/07/15 15:30

**Matrix:** Water **Sampled:** 04/07/15 14:15

Project: Swift Creek Water Quality Sampled By: Nancy Scott

### Metals (total recoverable) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	<u>Flag</u>	<u>Units</u>	<u>DF</u>	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Cadmium [7440-43-9]^	ND		ug/L	1	0.360	1.00	5D16018	EPA 6010C	04/17/15 14:42	JDH	
Calcium [7440-70-2]^	6550		ug/L	1	39.0	100	5D16018	EPA 6010C	04/17/15 14:42	JDH	
Copper [7440-50-8]^	4.13	JB	ug/L	1	1.60	10.0	5D16018	EPA 6010C	04/17/15 14:42	JDH	J-01
Lead [7439-92-1]^	ND		ug/L	1	3.10	10.0	5D16018	EPA 6010C	04/17/15 14:42	JDH	
Magnesium [7439-95-4]^	2230		ug/L	1	29.0	100	5D16018	EPA 6010C	04/17/15 14:42	JDH	
Nickel [7440-02-0]^	ND		ug/L	1	1.80	10.0	5D16018	EPA 6010C	04/17/15 14:42	JDH	
Potassium [7440-09-7]^	2330		ug/L	1	150	500	5D16018	EPA 6010C	04/17/15 14:42	JDH	
Sodium [7440-23-5]^	8040		ug/L	1	400	500	5D16018	EPA 6010C	04/17/15 14:42	JDH	
Zinc [7440-66-6]^	ND		ug/L	1	3.80	10.0	5D16018	EPA 6010C	04/17/15 14:42	JDH	

### **Classical Chemistry Parameters**

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	MDL	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Ammonia as N [7664-41-7]^	ND		mg/L	1	0.045	0.10	5D10011	EPA 350.1	04/10/15 13:18	SHA	
Chloride [16887-00-6]^	8.3		mg/L	1	2.2	5.0	5D09010	EPA 300.0	04/10/15 18:47	SHA	
Sulfate as SO4 [14808-79-8]^	4.0	J	mg/L	1	2.9	5.0	5D09010	EPA 300.0	04/10/15 18:47	SHA	
Total Alkalinity as CaCO3 [471-34-1]^	30		mg/L	1	14	15	5D10001	EPA 310.2	04/10/15 09:33	SHA	

### Classical Chemistry Parameters (Dissolved)

^ - ENCO Orlando certified analyte [NC 424]

Analyte [CAS Number]	Results	<u>Flag</u>	<u>Units</u>	<u>DF</u>	<u>MDL</u>	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Total Organic Carbon^	4.8		mg/L	1	0.34	1.0	5D15005	SM 5310B-2000	04/15/15 20:59	RSA	

**Description:** SR 1555 **Lab Sample ID:** C504461-04 **Received:** 04/07/15 15:30

**Matrix:** Water **Sampled:** 04/07/15 14:15

**Project:** Swift Creek Water Quality Sampled By: Nancy Scott

### Metals (Dissolved) by EPA 6000/7000 Series Methods

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Conner [7440-50-8]^	4.17	1R	ua/l	1	1 60	10.0	5D16018	FPA 6010C	04/17/15 14:44	1DH	1-01



### **ANALYTICAL RESULTS**

**Description:** NC 210 **Lab Sample ID:** C504461-05 **Received:** 04/07/15 15:30

**Matrix:** Water **Sampled:** 04/07/15 13:45

Project: Swift Creek Water Quality Sampled By: Nancy Scott

### Metals (total recoverable) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	Flag	<u>Units</u>	<u>DF</u>	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Cadmium [7440-43-9]^	ND		ug/L	1	0.360	1.00	5D16018	EPA 6010C	04/17/15 14:47	JDH	
Calcium [7440-70-2]^	6850		ug/L	1	39.0	100	5D16018	EPA 6010C	04/17/15 14:47	JDH	
Copper [7440-50-8]^	4.65	JB	ug/L	1	1.60	10.0	5D16018	EPA 6010C	04/17/15 14:47	JDH	J-01
Lead [7439-92-1]^	ND		ug/L	1	3.10	10.0	5D16018	EPA 6010C	04/17/15 14:47	JDH	
Magnesium [7439-95-4]^	2660		ug/L	1	29.0	100	5D16018	EPA 6010C	04/17/15 14:47	JDH	
Nickel [7440-02-0]^	ND		ug/L	1	1.80	10.0	5D16018	EPA 6010C	04/17/15 14:47	JDH	
Potassium [7440-09-7]^	2460		ug/L	1	150	500	5D16018	EPA 6010C	04/17/15 14:47	JDH	
Sodium [7440-23-5]^	8460		ug/L	1	400	500	5D16018	EPA 6010C	04/17/15 14:47	JDH	
Zinc [7440-66-6]^	ND		ug/L	1	3.80	10.0	5D16018	EPA 6010C	04/17/15 14:47	JDH	

### **Classical Chemistry Parameters**

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	<u>MDL</u>	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Ammonia as N [7664-41-7]^	ND		mg/L	1	0.045	0.10	5D10011	EPA 350.1	04/10/15 13:19	SHA	
Chloride [16887-00-6]^	8.5		mg/L	1	2.2	5.0	5D09010	EPA 300.0	04/10/15 19:06	SHA	
Sulfate as SO4 [14808-79-8]^	4.2	J	mg/L	1	2.9	5.0	5D09010	EPA 300.0	04/10/15 19:06	SHA	
Total Alkalinity as CaCO3 [471-34-1]^	26		mg/L	1	14	15	5D10001	EPA 310.2	04/10/15 09:34	SHA	

### Classical Chemistry Parameters (Dissolved)

^ - ENCO Orlando certified analyte [NC 424]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Total Organic Carbon	E 1		ma/l	1	0.34	1.0	ED15005	CM 5310B-2000	04/15/15 20:50	DCA	

**Description:** NC 210 **Lab Sample ID:** C504461-06 **Received:** 04/07/15 15:30

**Matrix:** Water **Sampled:** 04/07/15 13:45 **Work Order:** C504461

Project: Swift Creek Water Quality Sampled By: Nancy Scott

### Metals (Dissolved) by EPA 6000/7000 Series Methods

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	DF	<u>MDL</u>	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Conner [7440-50-8]^	4.13	1B	ua/l	1	1 60	10.0	5D16018	FPA 6010C	04/17/15 14:49	1DH	1-01



### Metals (total recoverable) by EPA 6000/7000 Series Methods - Quality Control

### Batch 5D16018 - EPA 3005A

LCS (5D16018-BS1)

Blank (5D16018-BLK1) Prepared: 04/16/2015 11:48 Analyzed: 04/17/2015 13:28

<u>Analyte</u>	Result	Flag	PQL	<u>Units</u>	Spike Level	Source Result	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Cadmium	0.360	U	1.00	ug/L							
Calcium	39.0	U	100	ug/L							
Copper	2.56	J	10.0	ug/L							
Lead	3.10	U	10.0	ug/L							
Magnesium	29.0	U	100	ug/L							
Nickel	1.80	U	10.0	ug/L							
Potassium	150	U	500	ug/L							
Sodium	400	U	500	ug/L							
Zinc	3.80	U	10.0	ug/L							

Prepared: 04/16/2015 11:48 Analyzed: 04/17/2015 13:38

<u>Analyte</u>	Result	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Cadmium	22.3		1.00	ug/L	20.0	<u> </u>	112	80-120			
Calcium	2320		100	ug/L	2000		116	80-120			
Copper	216	В	10.0	ug/L	200		108	80-120			
Lead	222		10.0	ug/L	200		111	80-120			
Magnesium	2190		100	ug/L	2000		110	80-120			
Nickel	221		10.0	ug/L	200		110	80-120			
Potassium	11200		500	ug/L	10000		112	80-120			
Sodium	10900		500	ug/L	10000		109	80-120			
Zinc	223		10.0	ug/L	200		111	80-120			

Matrix Spike (5D16018-MS1) Prepared: 04/16/2015 11:48 Analyzed: 04/17/2015 13:43

Source: C504461-01 %REC Spike RPD Source **Analyte** Result Flag POL Units Level %REC **Limits** RPD <u>Limit</u> Notes Result 20.0 75-125 Cadmium 22.6 1.00 ug/L 0.360 U 113 Calcium 9020 100 ug/L 2000 7000 101 75-125 10.0 200 109 75-125 Copper 223 В ug/L 5.91 Lead 223 10.0 ug/L 200 3.10 U 112 75-125 Magnesium 4420 100 ug/L 2000 2290 106 75-125 Nickel 10.0 200 1.80 U 112 75-125 224 ug/L Potassium 13600 500 ug/L 10000 2570 111 75-125 10000 75-125 Sodium 19300 500 ug/L 8620 107 Zinc 229 10.0 200 3.80 U 75-125 ug/L 114

Matrix Spike Dup (5D16018-MSD1) Prepared: 04/16/2015 11:48 Analyzed: 04/17/2015 13:46

Source: C504461-01

<u>Analyte</u>	<u>Result</u>	<u>Flaq</u>	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Cadmium	23.3		1.00	ug/L	20.0	0.360 U	116	75-125	3	20	
Calcium	8640		100	ug/L	2000	7000	82	75-125	4	20	
Copper	221	В	10.0	ug/L	200	5.91	107	75-125	1	20	
Lead	223		10.0	ug/L	200	3.10 U	111	75-125	0.1	20	
Magnesium	4290		100	ug/L	2000	2290	100	75-125	3	20	
Nickel	232		10.0	ug/L	200	1.80 U	116	75-125	3	20	
Potassium	13300		500	ug/L	10000	2570	108	75-125	2	20	
Sodium	18800		500	ug/L	10000	8620	102	75-125	3	20	
Zinc	236		10.0	ug/L	200	3.80 U	118	75-125	3	20	



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Batch 5D16018 - FPA 3005A - Contin
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Post Spike (5D16018-PS1)		Prepared: 04/16/2015 11:48 Analyzed: 04/17/2015 13:48											
Source: C504461-01													
<u>Analyte</u>	Result	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	<u>Notes</u>		
Cadmium	0.0219		0.00100	mg/L	0.0200	-7.35E-5	109	80-120					
Calcium	8.61		0.100	mg/L	2.00	7.00	80	80-120					
Copper	0.209	В	0.0100	mg/L	0.200	0.00591	102	80-120					
Lead	0.208		0.0100	mg/L	0.200	2.07E-5	104	80-120					
Magnesium	4.20		0.100	mg/L	2.00	2.29	96	80-120					
Nickel	0.217		0.0100	mg/L	0.200	8.54E-5	108	80-120					
Potassium	12.7		0.500	mg/L	10.0	2.57	102	80-120					
Sodium	18.4		0.500	mg/L	10.0	8.62	98	80-120					
Zinc	0.222		0.0100	mg/L	0.200	0.00209	110	80-120					
Metals (Dissolved) by EPA 6000/7	Metals (Dissolved) by EPA 6000/7000 Series Methods - Quality Control												

### Batch 5D16018 - EPA 3005A

Blank (5D16018-BLK2)					Prepar	ed: 04/16/201	5 11:48 Anal	yzed: 04/17/	2015 13:35		
<u>Analyte</u> Copper	<u>Result</u> 3.11	Flag J	<b>PQL</b> 10.0	<u>Units</u> ug/L	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	<u>Notes</u>
LCS (5D16018-BS1)				5,	Prepar	ed: 04/16/201	5 11:48 Anal	lyzed: 04/17/	2015 13:38		
<u>Analyte</u>	Result	<u>Flaq</u>	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Copper	216	В	10.0	ug/L	200		108	80-120			
Matrix Spike (5D16018-	MS1)				Prepar	ed: 04/16/201	5 11:48 Anal	lyzed: 04/17/	2015 13:43		
Source: C504461-01											
Analyte	<u>Result</u>	Flag	PQL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	<u>Notes</u>
Copper	223	В	10.0	ug/L	200	5.91	109	75-125			
Matrix Spike Dup (5D16	018-MSD1)				Prepar	ed: 04/16/201	5 11:48 Anal	yzed: 04/17/	2015 13:46		
Source: C504461-01											
			201		Spike	Source		%REC		RPD	

<u>Units</u>

ug/L

**Units** 

mg/L

Level

200

Spike

Level

0.200

%REC

107

Prepared: 04/16/2015 11:48 Analyzed: 04/17/2015 13:48

%REC

102

<u>Result</u>

5.91

Source

Result

0.00591

**Limits** 

75-125

%REC

<u>Limits</u>

80-120

RPD

RPD

<u>Limit</u>

20

RPD

<u>Limit</u>

Notes

Notes

### Copper 0.209 B

Classical Chemistry Parameters - Quality Control

<u>Flag</u>

В

Flag

Result

221

Result

<u>PQL</u>

10.0

**PQL** 

0.0100

### Batch 5D09010 - NO PREP

Post Spike (5D16018-PS1)

Source: C504461-01

 Blank (5D09010-BLK1)
 Prepared: 04/09/2015 09:53 Analyzed: 04/10/2015 10:08

Analyte	Result	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Chloride	2.2	U	5.0	mg/L							
Sulfate as SO4	2.9	U	5.0	mg/L							

**Analyte** 

Analyte

Copper



Batch 5D09010 - NO PREP -	Continued										
LCS (5D09010-BS1)					Prepare	ed: 04/09/201	5 09:53 Anal	yzed: 04/10/	2015 12:00		
nalyte	<u>Result</u>	<u>Flaq</u>	<u>PQL</u>	<u>Units</u>	Spike Level	Source Result	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Not
loride	53		5.0	mg/L	50.0		105	90-110			
lfate as SO4	50		5.0	mg/L	50.0		101	90-110			
Matrix Spike (5D09010-MS1)					Prepare	ed: 04/09/201	5 09:53 Anal	yzed: 04/10/	2015 12:18		
Source: C502700-04						_					
<u>nalyte</u>	Result	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Not
loride	680		50	mg/L	200	450	117	90-110			QM
lfate as SO4	340		50	mg/L	200	140	100	90-110			
Matrix Spike (5D09010-MS2)					Prepare	ed: 04/09/201	5 09:53 Anal	yzed: 04/10/	2015 13:14		
Source: C502701-02						_					
nalyte	Result	Flag	PQL	Units	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Not
loride	680		50	mg/L	200	460	109	90-110	2	<u> </u>	110
lfate as SO4	330		50	mg/L	200	130	97	90-110			
Matrix Spike Dup (5D09010-MS			50	1119/ L		ed: 04/09/201			2015 12:37		
Source: C502700-04	,							,			
nalyte	Result	Flag	POL	<u>Units</u>	Spike	Source	%REC	%REC	RPD	RPD	No
	<u> </u>	<u>i iaq</u>			Level	<u>Result</u>		<u>Limits</u>		<u>Limit</u>	No
loride	370		50	mg/L	200	450	NR	90-110	59	10	QM- QM
Ifate as SO4	180		50	mg/L	200	140	19	90-110	62	10	QM- QM
Batch 5D10001 - NO PREP											Qivi
Blank (5D10001-BLK1)					Prepare	ed: 04/10/201	5 07:22 Anal	yzed: 04/10/	2015 09:10		
					Spike	Source		%REC		RPD	
<u>nalyte</u>	Result	Flag	PQL	<u>Units</u>	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Not
tal Alkalinity as CaCO3	14	U	15	mg/L							
LCS (5D10001-BS1)					Prepare	ed: 04/10/201	5 07:22 Anal	yzed: 04/10/	2015 09:11		
					C!!	<b>C</b>		0/ BEC		222	
nalyte	Result	Flag	PQL	Units	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Not
tal Alkalinity as CaCO3	100		15	mg/L	100	<u>itcourc</u>	101	80-120			
Matrix Spike (5D10001-MS1)				3, =		ed: 04/10/201			2015 09:13		
Source: C503561-04											
nalyte	Result	<u>Flaq</u>	PQL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	No
tal Alkalinity as CaCO3	370		<del></del> 75	mg/L	200	170	101	80-120	2	<u> </u>	
Matrix Spike Dup (5D10001-MS			,,,	1119/ =		ed: 04/10/201			2015 09:13		
Source: C503561-04					•			·			
nalyte	Result	<u>Flaq</u>	POL	<u>Units</u>	Spike Level	Source	%REC	%REC <u>Limits</u>	RPD	RPD Limit	Not
indi y cc	<u>iveanr</u>	<u>ay</u>	<u>. VL</u>	<u>UIIIUS</u>	revei	Result	FOREC	LIIIILS	KPD	<u>Limit</u>	140
tal Alkalinity as CaCO3	350		75	mg/L	200	170	93	80-120	5	25	



Classical Chemistry Parameters	- Quality Con	Ci Oi									
Batch 5D10011 - NO PREP	- Continued										
Blank (5D10011-BLK1)					Prepare	ed: 04/10/201	5 10:02 Anal	yzed: 04/10/2	2015 12:23		
<u>Analyte</u>	<u>Result</u>	<u>Flaq</u>	<u>POL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	<u>Notes</u>
Ammonia as N	0.045	U	0.10	mg/L							
LCS (5D10011-BS1)					Prepare	ed: 04/10/201	5 10:02 Anal	yzed: 04/10/2	2015 12:25		
					Spike	Source		%REC		RPD	
<u>Analyte</u>	Result	Flag	POL	<u>Units</u>	Level	Result	%REC	<u>Limits</u>	RPD	<u>Limit</u>	<u>Note</u> :
Ammonia as N	0.97		0.10	mg/L	0.997		97	90-110			
Matrix Spike (5D10011-MS1)					Prepare	ed: 04/10/201	5 10:02 Anal	yzed: 04/10/2	2015 12:30		
Source: C502640-02					Spike	Source		%REC		RPD	
Analyte	Result	Flag	POL	Units	Level	Result	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Notes
Ammonia as N	0.35		0.10	mg/L	0.387	0.045 U	91	90-110			
Matrix Spike (5D10011-MS2)					Prepare	ed: 04/10/201	5 10:02 Anal	yzed: 04/10/2	2015 12:36		
Source: C502681-01											
<u>Analyte</u>	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Ammonia as N	150		10	mg/L	39.8	100	112	90-110	2	<u></u>	QM-0
Matrix Spike Dup (5D10011-N	(SD1)				Prepare	ed: 04/10/201	5 10:02 Anal	yzed: 04/10/2	2015 12:32		
Source: C502640-02											
	Daguit	Fl	POL	lluit.	Spike	Source	0/ 550	%REC		RPD	
Analyte	Result	<u>Flaq</u>	<b>POL</b>	<u>Units</u>	Level	Result	<b>%REC</b>	<u>Limits</u>	RPD 4	<u>Limit</u>	Notes
<b>Analyte</b> Ammonia as N	0.36		0.10	<u>Units</u> mg/L	-		<b>%REC</b> 94		<b>RPD</b> 4		<u>Note</u>
Analyte	0.36		0.10		Level	Result		<u>Limits</u>		<u>Limit</u>	Notes
Analyte Ammonia as N Classical Chemistry Parameters	0.36		0.10		<b>Level</b> 0.387	Result	94	<u>Limits</u> 90-110	4	<u>Limit</u>	<u>Notes</u>
Analyte Ammonia as N  Classical Chemistry Parameters  Batch 5D15005 - NO PREP	0.36		0.10		<b>Level</b> 0.387	<u>Result</u> 0.045 U	94	<u>Limits</u> 90-110	4	<u>Limit</u>	<u>Notes</u>
Analyte  Ammonia as N  Classical Chemistry Parameters  Batch 5D15005 - NO PREP  Blank (5D15005-BLK1)  Analyte  Total Organic Carbon	0.36 (Dissolved) -	Quality	0.10	mg/L	Level 0.387  Prepare  Spike	Result 0.045 U	94 5 15:00 Anal	Limits 90-110 yzed: 04/15/3	4 2015 20:59	Limit 10	
Analyte  Ammonia as N  Classical Chemistry Parameters  Batch 5D15005 - NO PREP  Blank (5D15005-BLK1)  Analyte	0.36  (Dissolved) -	Quality Flag	0.10  Control	mg/L	Prepare  Spike Level	Result 0.045 U	94 5 15:00 Anal	Limits 90-110  yzed: 04/15/2  %REC Limits	4 2015 20:59 <b>RPD</b>	Limit 10	
Analyte  Ammonia as N  Classical Chemistry Parameters  Batch 5D15005 - NO PREP  Blank (5D15005-BLK1)  Analyte  Total Organic Carbon	0.36  (Dissolved) -	Quality Flag	0.10  Control	mg/L	Prepare  Spike Level  Prepare	Result 0.045 U  ed: 04/15/201  Source Result  ed: 04/15/201	94 5 15:00 Anal	Limits   90-110	4 2015 20:59 <b>RPD</b>	Limit 10  RPD Limit	
Analyte  Ammonia as N  Classical Chemistry Parameters  Batch 5D15005 - NO PREP  Blank (5D15005-BLK1)  Analyte  Total Organic Carbon	0.36  (Dissolved) -	Quality Flag	0.10  Control	mg/L	Prepare  Spike Level	Result 0.045 U  ed: 04/15/201  Source Result  Source	94 5 15:00 Anal	Limits 90-110  yzed: 04/15/2  %REC Limits	4 2015 20:59 <b>RPD</b>	Limit 10	Note
Analyte Ammonia as N  Classical Chemistry Parameters  Batch 5D15005 - NO PREP  Blank (5D15005-BLK1)  Analyte  Total Organic Carbon  LCS (5D15005-BS1)	0.36 (Dissolved) -  Result 0.34	<b>Quality</b> Flag  U	0.10  Control  POL  1.0	mg/L <u>Units</u> mg/L	Level 0.387  Prepare  Spike Level  Prepare  Spike	Result 0.045 U  ed: 04/15/201  Source Result  ed: 04/15/201	94 5 15:00 Anal %REC 5 15:00 Anal	Limits   90-110	4 2015 20:59 <b>RPD</b> 2015 20:59	Limit 10  RPD Limit	Note
Analyte Ammonia as N  Classical Chemistry Parameters  Batch 5D15005 - NO PREP  Blank (5D15005-BLK1)  Analyte  Total Organic Carbon  LCS (5D15005-BS1)	0.36 (Dissolved) -  Result 0.34  Result 41	<b>Quality</b> Flag  U	0.10  Control  POL 1.0	mg/L  Units  mg/L	Prepare  Spike Level  Prepare  Spike Level  40.0	Result 0.045 U  ed: 04/15/201  Source Result  Source	94 5 15:00 Anal	yzed: 04/15/2 %REC Limits yzed: 04/15/2 %REC Limits specified to the second sec	4 2015 20:59 RPD 2015 20:59	Limit 10  RPD Limit	Note
Analyte Ammonia as N  Classical Chemistry Parameters  Batch 5D15005 - NO PREP  Blank (5D15005-BLK1)  Analyte  Total Organic Carbon  LCS (5D15005-BS1)  Analyte  Total Organic Carbon	0.36 (Dissolved) -  Result 0.34  Result 41	<b>Quality</b> Flag  U	0.10  Control  POL 1.0	mg/L  Units  mg/L	Prepare  Spike Level  Prepare  Spike Level  40.0	Result   0.045 U	94 5 15:00 Anal	yzed: 04/15/2 %REC Limits yzed: 04/15/2 %REC Limits specified to the second sec	4 2015 20:59 RPD 2015 20:59	Limit 10  RPD Limit	Note
Analyte Ammonia as N  Classical Chemistry Parameters  Batch 5D15005 - NO PREP  Blank (5D15005-BLK1)  Analyte  Total Organic Carbon  LCS (5D15005-BS1)  Analyte  Total Organic Carbon  Matrix Spike (5D15005-MS1)  Source: A502188-01	0.36  (Dissolved) -  Result 0.34  Result 41	Quality  Flag  U	0.10  Control  POL 1.0  POL 1.0	mg/L  Units  mg/L  Units  mg/L	Prepare  Spike Level  Prepare  Spike Level  40.0  Prepare  Spike	Result 0.045 U  Source Result  Source Result  Source Result  Source Result  Source Result  Source Result	94 5 15:00 Anal %REC 5 15:00 Anal %REC 103 5 15:00 Anal	Vision of the content of the c	4 2015 20:59 RPD 2015 20:59 RPD	RPD Limit  RPD Limit	Note:
Analyte Ammonia as N  Classical Chemistry Parameters  Batch 5D15005 - NO PREP  Blank (5D15005-BLK1)  Analyte  Total Organic Carbon  LCS (5D15005-BS1)  Analyte  Total Organic Carbon  Matrix Spike (5D15005-MS1)	0.36 (Dissolved) -  Result 0.34  Result 41	<b>Quality</b> Flag  U	0.10  Control  POL 1.0  POL 1.0	Units mg/L  Units mg/L  Units	Prepare  Spike Level  Prepare  Spike Level  40.0  Prepare	Result 0.045 U  Source Result  Source Result  Source Result  Source Result	94 5 15:00 Anal	Vision of the content of the c	4 2015 20:59 RPD 2015 20:59	RPD Limit  RPD Limit	Note:
Analyte Ammonia as N  Classical Chemistry Parameters  Batch 5D15005 - NO PREP  Blank (5D15005-BLK1)  Analyte  Total Organic Carbon  LCS (5D15005-BS1)  Analyte  Total Organic Carbon  Matrix Spike (5D15005-MS1)  Source: A502188-01  Analyte	Result 41  Result 68	Quality  Flag  U	0.10  Control  POL 1.0  POL 1.0	mg/L  Units  mg/L  Units  mg/L	Prepare  Spike Level  40.0  Prepare  Spike Level  40.0  Prepare  40.0	Result   0.045 U	94 5 15:00 Anal %REC 103 5 15:00 Anal 5 15:00 Anal	yzed: 04/15/2  %REC Limits  85-115  %REC Limits  85-115  %REC Limits  85-115	4 2015 20:59 RPD 2015 20:59 RPD	RPD Limit  RPD Limit	Note:
Analyte Ammonia as N  Classical Chemistry Parameters  Batch 5D15005 - NO PREP  Blank (5D15005-BLK1)  Analyte  Total Organic Carbon  LCS (5D15005-BS1)  Analyte  Total Organic Carbon  Matrix Spike (5D15005-MS1)  Source: A502188-01  Analyte  Total Organic Carbon	Result 41  Result 68	Quality  Flag  U	0.10  Control  POL 1.0  POL 1.0	Units mg/L  Units mg/L  Units	Prepare  Spike Level  40.0  Prepare  Spike Level  40.0  Prepare  40.0	Result   0.045 U	94 5 15:00 Anal %REC 103 5 15:00 Anal 5 15:00 Anal	yzed: 04/15/2  %REC Limits  85-115  %REC Limits  85-115  %REC Limits  85-115	4 2015 20:59 RPD 2015 20:59 RPD	RPD Limit  RPD Limit	Note:
Analyte Ammonia as N  Classical Chemistry Parameters  Batch 5D15005 - NO PREP  Blank (5D15005-BLK1)  Analyte  Total Organic Carbon  LCS (5D15005-BS1)  Analyte  Total Organic Carbon  Matrix Spike (5D15005-MS1)  Source: A502188-01  Analyte  Total Organic Carbon  Matrix Spike (5D15005-MS1)  Analyte  Total Organic Carbon	Result 41  Result 68	Quality  Flag  U	0.10  Control  POL 1.0  POL 1.0	Units mg/L  Units mg/L  Units	Prepare  Spike Level  40.0  Prepare  Spike Level  40.0  Prepare  40.0	Result   0.045 U	94 5 15:00 Anal %REC 103 5 15:00 Anal 5 15:00 Anal	yzed: 04/15/2  %REC Limits  85-115  %REC Limits  85-115  %REC Limits  85-115	4 2015 20:59 RPD 2015 20:59 RPD	RPD Limit  RPD Limit	



### **FLAGS/NOTES AND DEFINITIONS**

- **B** The analyte was detected in the associated method blank.
- **D** The sample was analyzed at dilution.
- The reported value is between the laboratory method detection limit (MDL) and the laboratory method reporting limit (MRL), adjusted for actual sample preparation data and moisture content, where applicable.
- **U** The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
- **E** The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate.
- MRL Method Reporting Limit. The MRL is roughly equivalent to the practical quantitation limit (PQL) and is based on the low point of the calibration curve, when applicable, sample preparation factor, dilution factor, and, in the case of soil samples, moisture content.
- **ND** The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
- **N** The analysis indicates the presence of an analyte for which there is presumptive evidence (85% or greater confidence) to make a "tentative identification".
- **P** Greater than 25% concentration difference was observed between the primary and secondary GC column. The lower concentration is reported.
- **J-01** Result is estimated due to positive results in the associated method blank.
- **QM-05** The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.
- **QM-07** The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS recovery.
- **QM-11** Precision between duplicate matrix spikes of the same sample was outside acceptance limits.



# ENVIRONMENTAL CONSERVATION LABORATORIES CHAIN-OF-CUSTODY RECORD

10776 Central Part Dr.
Orlando, FL 32624
(407) 828-5314 Fair (407) 650-6945

4810 Executive Park Court, Surju 211 Judisconville, FL 32215-5369 (904) 298-3907 Fax (904) 296-9210

102:A Woodwinds Indicatrial Ct. Clary, NC 27511 (910)-467-3000 Fax (919)-467-3515

www.encolabs.com

		Comm				= 1				Bern a	The Address 1000 City/ST/2lp H1 IIS 170 City/ST/2lp G19-7 Sampler(s)
		ange All Prigared By arements/Special Repairing Paguirements					NC 210	SR  555	NC 50	Sample ID (Fled Identification)	The Catena Group  Address 1000 Gorporate Drive, Switchel City/Strizip HIllsborough NC 27278 Tol G19-732-1300 Sampler(2) Statena, Arthabora (Print) Sampler(2) Signatura
		DateTree					417/15	4/7/15	4/7/15	Collection Date	18
Cooler V	Bullinguisted By	Helicopathed By					1.45	51.12	2:45	Collection	Project Numerousis  Swift Cr  Policy Alleng Info.  Responsing Contact  NANCY  Ste Location / Time Zone
Cooler IVs & Temps on Receipt	tied By:	Allah By				X III	Kee		TIX ALI	Comp / Grap	Project Number  Sw. ft Cree K  PO a / Ellitrag Info:  Responsing Contact  NAMCY Scott  Billing Contact  Site Lecation / Time Zone
10,000		Build							1	Matrix (nere codes)	
		8	()				6	6	6	Containes	
	D	0 - 0	< Total								Alkalinity 310.2, Chiorida 300
	Date/Time	Sent in	Total # of Containers								Ammonia 350.1 Ca. Cd. Cu. K. Mg. Na. N.
		33	mers		H						villo C / E
5	Regarded By	2		3							Sulfate 300 TOC SM5310B Dissolution
		2									TOC SM5310B Dissol
Con		)									осельзуу)
Condition Open Receipt				3							
	CutaTime	4/11/15 15								Sample Comments	Hequested furnaround firmes  Note Roah sequents subject to acceptance by the tacility  Standard  Expedited  Due / /  ab Workorder  C SOW()

(6)

102-A Woodwinds Industrial Court Cary NC, 27511

Phone: 919.467.3090 FAX: 919.467.3515

Thursday, May 21, 2015 The Catena Group (TH015) Attn: Nancy Scott 410-B Millstone Drive Hillsborough, NC 27278

RE: Laboratory Results for

Project Number: [none], Project Name/Desc: Swift Creek Water Quality

ENCO Workorder(s): C505742

Dear Nancy Scott,

Enclosed is a copy of your laboratory report for test samples received by our laboratory on Thursday, May 7, 2015.

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. Results for these procedures apply only to the samples as submitted.

The analytical results contained in this report are in compliance with NELAC standards, except as noted in the project narrative. This report shall not be reproduced except in full, without the written approval of the Laboratory.

This report contains only those analyses performed by Environmental Conservation Laboratories. Unless otherwise noted, all analyses were performed at ENCO Cary. Data from outside organizations will be reported under separate cover.

If you have any questions or require further information, please do not hesitate to contact me.

Sill Scatt

Sincerely,

Bill Scott

Project Manager

Enclosure(s)



### SAMPLE SUMMARY/LABORATORY CHRONICLE

Client ID: NC 210		Lab ID:	C505742-01	Sampled:	05/07/15	13:25	Received:	05/07/15 15:17
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	:/Time(s)		Analysis Date/	Time(s)	
EPA 300.0	06/04/15		05/13/15	22:01		05/13/15 22:01		
EPA 310.2	05/21/15		05/08/15	09:38		05/08/15 13:10		
EPA 350.1	06/04/15		05/13/15	07:21		05/13/15 09:57		
EPA 6010C	11/03/15		05/18/15	16:30		05/20/15 11:06		
SM 5310B-2000	06/04/15		05/19/15	08:25		05/19/15 16:44		
Client ID: SR 1555		Lab ID:	C505742-02	Sampled:	05/07/15	13:55	Received:	05/07/15 15:17
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	:/Time(s)		Analysis Date/	Time(s)	
EPA 300.0	06/04/15		05/13/15	22:19		05/13/15 22:19		
EPA 310.2	05/21/15		05/08/15	09:38		05/08/15 13:10		
EPA 350.1	06/04/15		05/13/15	07:21		05/13/15 09:59		
EPA 6010C	11/03/15		05/18/15	16:30		05/20/15 12:03		
SM 5310B-2000	06/04/15		05/19/15	08:25		05/19/15 16:44		
Client ID: NC-50		Lab ID:	C505742-03	Sampled:	05/07/15	14:30	Received:	05/07/15 15:17
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	/Time(s)		Analysis Date/	Time(s)	
EPA 300.0	06/04/15		05/13/15	22:36		05/13/15 22:36		
EPA 310.2	05/21/15		05/08/15	09:38		05/08/15 13:11		
EPA 350.1	06/04/15		05/13/15	07:21		05/13/15 10:01		
EPA 6010C	11/03/15		05/18/15	16:30		05/20/15 12:06		
SM 5310B-2000	06/04/15		05/19/15	08:25		05/19/15 16:44		
Client ID: NC 210 Dissolved		Lab ID:	C505742-04	Sampled:	05/07/15	13:25	Received:	05/07/15 15:17
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	:/Time(s)		Analysis Date/	Time(s)	
EPA 6010C	11/03/15		05/18/15	16:30		05/20/15 12:08		
Client ID: SR 1555 Dissolved		Lab ID:	C505742-05	Sampled:	05/07/15	13:55	Received:	05/07/15 15:17
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	/Time(s)		Analysis Date/	Time(s)	
EPA 6010C	11/03/15		05/18/15	16:30		05/20/15 12:11		
Client ID: NC 50 Dissolved		Lab ID:	C505742-06	Sampled:	05/07/15	14:30	Received:	05/07/15 15:17
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	/Time(s)		Analysis Date/	Time(s)	
EPA 6010C	11/03/15		05/18/15	16:30		05/20/15 12:13		



### **SAMPLE DETECTION SUMMARY**

Client ID: NC 210			Lab ID:	C505742-01			
<u>Analyte</u>	<u>Results</u>	<u>Flag</u>	MDL	<u>PQL</u>	<u>Units</u>	<u>Method</u>	Notes
Ammonia as N	0.060	J	0.045	0.10	mg/L	EPA 350.1	
Calcium - Total	5790		39.0	100	ug/L	EPA 6010C	
Chloride	7.1		2.2	5.0	mg/L	EPA 300.0	
Copper - Total	2.01	J	1.60	10.0	ug/L	EPA 6010C	
Magnesium - Total	2270		29.0	100	ug/L	EPA 6010C	
Potassium - Total	2360		150	500	ug/L	EPA 6010C	
Sodium - Total	7070		400	500	ug/L	EPA 6010C	
Sulfate as SO4	3.8	J	2.9	5.0	mg/L	EPA 300.0	
Total Alkalinity as CaCO3	25		14	15	mg/L	EPA 310.2	
Total Organic Carbon - Dissolved	5.3		0.34	1.0	mg/L	SM 5310B-2000	
Client ID: SR 1555			Lab ID:	C505742-02			
<u>Analyte</u>	<u>Results</u>	<u>Flag</u>	<u>MDL</u>	<u>PQL</u>	<u>Units</u>	<u>Method</u>	Notes
Ammonia as N	0.078	J	0.045	0.10	mg/L	EPA 350.1	
Calcium - Total	5460		39.0	100	ug/L	EPA 6010C	
Chloride	7.3		2.2	5.0	mg/L	EPA 300.0	
Magnesium - Total	2030		29.0	100	ug/L	EPA 6010C	
Potassium - Total	2160		150	500	ug/L	EPA 6010C	
Sodium - Total	7500		400	500	ug/L	EPA 6010C	
Sulfate as SO4	3.8	J	2.9	5.0	mg/L	EPA 300.0	
Total Alkalinity as CaCO3	21		14	15	mg/L	EPA 310.2	
Total Organic Carbon - Dissolved	4.9		0.34	1.0	mg/L	SM 5310B-2000	
Client ID: NC-50			Lab ID:	C505742-03			
<u>Analyte</u>	<u>Results</u>	<u>Flag</u>	<u>MDL</u>	<u>PQL</u>	<u>Units</u>	<u>Method</u>	Notes
Ammonia as N	0.051	J	0.045	0.10	mg/L	EPA 350.1	
Calcium - Total	6310		39.0	100	ug/L	EPA 6010C	
Chloride	8.8		2.2	5.0	mg/L	EPA 300.0	
Copper - Total	2.03	J	1.60	10.0	ug/L	EPA 6010C	
Magnesium - Total	1970		29.0	100	ug/L	EPA 6010C	
Potassium - Total	2500		150	500	ug/L	EPA 6010C	
Sodium - Total	7010		400	500	ug/L	EPA 6010C	
Sulfate as SO4	4.2	J	2.9	5.0	mg/L	EPA 300.0	
Total Alkalinity as CaCO3	19		14	15	mg/L	EPA 310.2	
Total Organic Carbon - Dissolved	6.0		0.34	1.0	mg/L	SM 5310B-2000	
Client ID: NC 50 Dissolved			Lab ID:	C505742-06			
<u>Analyte</u>	<u>Results</u>	<u>Flag</u>	<u>MDL</u>	<u>PQL</u>	<u>Units</u>	<u>Method</u>	Notes
Copper - Dissolved	1.75	J	1.60	10.0	ug/L	EPA 6010C	



### **ANALYTICAL RESULTS**

**Description:** NC 210 **Lab Sample ID:** C505742-01 **Received:** 05/07/15 15:17

**Matrix:** Water **Sampled:** 05/07/15 13:25

Project: Swift Creek Water Quality Sampled By: Nancy Scott

### Metals (total recoverable) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Cadmium [7440-43-9]^	ND		ug/L	1	0.360	1.00	5E18026	EPA 6010C	05/20/15 11:06	JDH	
Calcium [7440-70-2]^	5790		ug/L	1	39.0	100	5E18026	EPA 6010C	05/20/15 11:06	JDH	
Copper [7440-50-8]^	2.01	J	ug/L	1	1.60	10.0	5E18026	EPA 6010C	05/20/15 11:06	JDH	
Lead [7439-92-1]^	ND		ug/L	1	3.10	10.0	5E18026	EPA 6010C	05/20/15 11:06	JDH	
Magnesium [7439-95-4]^	2270		ug/L	1	29.0	100	5E18026	EPA 6010C	05/20/15 11:06	JDH	
Nickel [7440-02-0]^	ND		ug/L	1	1.80	10.0	5E18026	EPA 6010C	05/20/15 11:06	JDH	
Potassium [7440-09-7]^	2360		ug/L	1	150	500	5E18026	EPA 6010C	05/20/15 11:06	JDH	
Sodium [7440-23-5]^	7070		ug/L	1	400	500	5E18026	EPA 6010C	05/20/15 11:06	JDH	
Zinc [7440-66-6]^	ND		ug/L	1	3.80	10.0	5E18026	EPA 6010C	05/20/15 11:06	JDH	

### **Classical Chemistry Parameters**

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	DF	<u>MDL</u>	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Ammonia as N [7664-41-7]^	0.060	J	mg/L	1	0.045	0.10	5E13001	EPA 350.1	05/13/15 09:57	SHA	
Chloride [16887-00-6]^	7.1		mg/L	1	2.2	5.0	5E13007	EPA 300.0	05/13/15 22:01	AJB	
Sulfate as SO4 [14808-79-8]^	3.8	J	mg/L	1	2.9	5.0	5E13007	EPA 300.0	05/13/15 22:01	AJB	
Total Alkalinity as CaCO3 [471-34-1]^	25		mg/L	1	14	15	5E08009	EPA 310.2	05/08/15 13:10	SHA	

### Classical Chemistry Parameters (Dissolved)

^ - ENCO Orlando certified analyte [NC 424]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Total Organic Carbon^	5.3		ma/l	1	0.34	1.0	5F19004	SM 5310B-2000	05/19/15 16:44	RSΔ	



### **ANALYTICAL RESULTS**

**Description:** SR 1555 **Lab Sample ID:** C505742-02 **Received:** 05/07/15 15:17

**Matrix:** Water **Sampled:** 05/07/15 13:55

Project: Swift Creek Water Quality Sampled By: Nancy Scott

### Metals (total recoverable) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Cadmium [7440-43-9]^	ND		ug/L	1	0.360	1.00	5E18026	EPA 6010C	05/20/15 12:03	JDH	
Calcium [7440-70-2]^	5460		ug/L	1	39.0	100	5E18026	EPA 6010C	05/20/15 12:03	JDH	
Copper [7440-50-8]^	ND		ug/L	1	1.60	10.0	5E18026	EPA 6010C	05/20/15 12:03	JDH	
Lead [7439-92-1]^	ND		ug/L	1	3.10	10.0	5E18026	EPA 6010C	05/20/15 12:03	JDH	
Magnesium [7439-95-4]^	2030		ug/L	1	29.0	100	5E18026	EPA 6010C	05/20/15 12:03	JDH	
Nickel [7440-02-0]^	ND		ug/L	1	1.80	10.0	5E18026	EPA 6010C	05/20/15 12:03	JDH	
Potassium [7440-09-7]^	2160		ug/L	1	150	500	5E18026	EPA 6010C	05/20/15 12:03	JDH	
Sodium [7440-23-5]^	7500		ug/L	1	400	500	5E18026	EPA 6010C	05/20/15 12:03	JDH	
Zinc [7440-66-6]^	ND		ug/L	1	3.80	10.0	5E18026	EPA 6010C	05/20/15 12:03	JDH	

### **Classical Chemistry Parameters**

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	DF	<u>MDL</u>	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<b>Analyzed</b>	By	<u>Notes</u>
Ammonia as N [7664-41-7]^	0.078	J	mg/L	1	0.045	0.10	5E13001	EPA 350.1	05/13/15 09:59	SHA	
Chloride [16887-00-6]^	7.3		mg/L	1	2.2	5.0	5E13007	EPA 300.0	05/13/15 22:19	AJB	
Sulfate as SO4 [14808-79-8]^	3.8	J	mg/L	1	2.9	5.0	5E13007	EPA 300.0	05/13/15 22:19	AJB	
Total Alkalinity as CaCO3 [471-34-1]^	21		mg/L	1	14	15	5E08009	EPA 310.2	05/08/15 13:10	SHA	

### Classical Chemistry Parameters (Dissolved)

^ - ENCO Orlando certified analyte [NC 424]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	MDL	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Total Organic Carbon^	4.9		mg/L	1	0.34	1.0	5E19004	SM 5310B-2000	05/19/15 16:44	RSA	



### **ANALYTICAL RESULTS**

**Description:** NC-50 **Lab Sample ID:** C505742-03 **Received:** 05/07/15 15:17

**Matrix:** Water **Sampled:** 05/07/15 14:30 **Work Order:** C505742

**Project:** Swift Creek Water Quality Sampled By: Nancy Scott

### Metals (total recoverable) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Cadmium [7440-43-9]^	ND		ug/L	1	0.360	1.00	5E18026	EPA 6010C	05/20/15 12:06	JDH	
Calcium [7440-70-2]^	6310		ug/L	1	39.0	100	5E18026	EPA 6010C	05/20/15 12:06	JDH	
Copper [7440-50-8]^	2.03	J	ug/L	1	1.60	10.0	5E18026	EPA 6010C	05/20/15 12:06	JDH	
Lead [7439-92-1]^	ND		ug/L	1	3.10	10.0	5E18026	EPA 6010C	05/20/15 12:06	JDH	
Magnesium [7439-95-4]^	1970		ug/L	1	29.0	100	5E18026	EPA 6010C	05/20/15 12:06	JDH	
Nickel [7440-02-0]^	ND		ug/L	1	1.80	10.0	5E18026	EPA 6010C	05/20/15 12:06	JDH	
Potassium [7440-09-7]^	2500		ug/L	1	150	500	5E18026	EPA 6010C	05/20/15 12:06	JDH	
Sodium [7440-23-5]^	7010		ug/L	1	400	500	5E18026	EPA 6010C	05/20/15 12:06	JDH	
Zinc [7440-66-6]^	ND		ug/L	1	3.80	10.0	5E18026	EPA 6010C	05/20/15 12:06	JDH	

### **Classical Chemistry Parameters**

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	<u>MDL</u>	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Ammonia as N [7664-41-7]^	0.051	J	mg/L	1	0.045	0.10	5E13001	EPA 350.1	05/13/15 10:01	SHA	
Chloride [16887-00-6]^	8.8		mg/L	1	2.2	5.0	5E13007	EPA 300.0	05/13/15 22:36	AJB	
Sulfate as SO4 [14808-79-8]^	4.2	J	mg/L	1	2.9	5.0	5E13007	EPA 300.0	05/13/15 22:36	AJB	
Total Alkalinity as CaCO3 [471-34-1]^	19		mg/L	1	14	15	5E08009	EPA 310.2	05/08/15 13:11	SHA	

### Classical Chemistry Parameters (Dissolved)

^ - ENCO Orlando certified analyte [NC 424]

Analyte [CAS Number] Results <u>Flag</u> **Units** DF <u>MDL</u> <u>PQL</u> **Batch Method Analyzed** <u>By</u> **Notes** Total Organic Carbon^ 6.0 mg/L 0.34 1.0 5E19004 SM 5310B-2000 05/19/15 16:44

**Description:** NC 210 Dissolved **Lab Sample ID:** C505742-04 **Received:** 05/07/15 15:17

**Matrix:** Water **Sampled:** 05/07/15 13:25

Project: Swift Creek Water Quality Sampled By: Nancy Scott

### Metals (Dissolved) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number] Results **Units** DF MDL <u>PQL</u> **Batch Method Analyzed Notes** <u>Flaq</u> By ug/L EPA 6010C Copper [7440-50-8]^ ND 1.60 10.0 5E18026 05/20/15 12:08 JDH

**Description:** SR 1555 Dissolved **Lab Sample ID:** C505742-05 **Received:** 05/07/15 15:17

**Matrix:** Water **Sampled:** 05/07/15 13:55 **Work Order:** C505742

Project: Swift Creek Water Quality Sampled By: Nancy Scott

### Metals (Dissolved) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number] MDL **PQL** Results **Units** DF Method **Analyzed** Flag **Batch** By **Notes** 05/20/15 12:11 Copper [7440-50-8]^ ND ug/L 1.60 10.0 5E18026 EPA 6010C JDH

**Description:** NC 50 Dissolved **Lab Sample ID:** C505742-06 **Received:** 05/07/15 15:17

**Matrix:** Water **Sampled:** 05/07/15 14:30 **Work Order:** C505742

Project: Swift Creek Water Quality Sampled By: Nancy Scott

### Metals (Dissolved) by EPA 6000/7000 Series Methods

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	DF	<u>MDL</u>	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Copper [7440-50-8]^	1.75	]	ua/L	1	1.60	10.0	5E18026	EPA 6010C	05/20/15 12:13	JDH	



### Metals (total recoverable) by EPA 6000/7000 Series Methods - Quality Control

### Batch 5E18026 - EPA 3005A

Blank (5E18026-BLK1) Prepared: 05/18/2015 16:30 Analyzed: 05/20/2015 10:48

Analyte	Result	Flag	POL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Cadmium	0.360	U	1.00	ug/L							
Calcium	39.0	U	100	ug/L							
Copper	1.60	U	10.0	ug/L							
Lead	3.10	U	10.0	ug/L							
Magnesium	29.0	U	100	ug/L							
Nickel	1.80	U	10.0	ug/L							
Potassium	150	U	500	ug/L							
Sodium	400	U	500	ug/L							
Zinc	3.80	U	10.0	ug/L							

LCS (5E18026-BS1) Prepared: 05/18/2015 16:30 Analyzed: 05/20/2015 11:03

<u>Analyte</u>	Result	<u>Flaq</u>	<u>PQL</u>	<u>Units</u>	Spike Level	Source Result	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
	· · · · · · · · · · · · · · · · · · ·					Result			KI D	Linie	Hotes
Cadmium	19.6		1.00	ug/L	20.0		98	80-120			
Calcium	2180		100	ug/L	2000		109	80-120			
Copper	198		10.0	ug/L	200		99	80-120			
Lead	208		10.0	ug/L	200		104	80-120			
Magnesium	2020		100	ug/L	2000		101	80-120			
Nickel	202		10.0	ug/L	200		101	80-120			
Potassium	10400		500	ug/L	10000		104	80-120			
Sodium	9990		500	ug/L	10000		100	80-120			
Zinc	207		10.0	ug/L	200		104	80-120			

Matrix Spike (5E18026-MS1) Prepared: 05/18/2015 16:30 Analyzed: 05/20/2015 11:09

Source: C505742-01 %REC Spike RPD Source **Analyte** Result Flag POL Units Level %REC **Limits** RPD <u>Limit</u> Notes Result 75-125 18.8 1.00 ug/L 20.0 0.360 U 94

Cadmium Calcium 7640 100 ug/L 2000 5790 93 75-125 10.0 200 75-125 Copper 190 ug/L 2.01 94 Lead 198 10.0 ug/L 200 3.10 U 99 75-125 Magnesium 4200 100 ug/L 2000 2270 97 75-125 Nickel 10.0 200 1.80 U 96 75-125 193 ug/L Potassium 12100 500 ug/L 10000 2360 98 75-125 10000 75-125 Sodium 16900 500 ug/L 7070 98 Zinc 199 10.0 200 3.80 U 100 75-125 ug/L

Matrix Spike Dup (5E18026-MSD1) Prepared: 05/18/2015 16:30 Analyzed: 05/20/2015 11:11

Source: C505742-01

<u>Analyte</u>	Result	<u>Flaq</u>	<u>PQL</u>	<u>Units</u>	Spike Level	Source	%REC	%REC Limits	RPD	RPD <u>Limit</u>	Notes
Andrec	Nesure	<u>i iuq</u>	<u>. VL</u>	<u>Omics</u>	Level	<u>Result</u>	70KEC	LIIIILS	RPD	LIIIIL	Hotes
Cadmium	18.7		1.00	ug/L	20.0	0.360 U	94	75-125	0.6	20	
Calcium	7600		100	ug/L	2000	5790	91	75-125	0.6	20	
Copper	190		10.0	ug/L	200	2.01	94	75-125	0.09	20	
Lead	197		10.0	ug/L	200	3.10 U	99	75-125	0.4	20	
Magnesium	4180		100	ug/L	2000	2270	96	75-125	0.4	20	
Nickel	193		10.0	ug/L	200	1.80 U	97	75-125	0.2	20	
Potassium	12100		500	ug/L	10000	2360	97	75-125	0.5	20	
Sodium	16700		500	ug/L	10000	7070	96	75-125	1	20	
Zinc	200		10.0	ug/L	200	3.80 U	100	75-125	0.5	20	



### Metals (total recoverable) by EPA 6000/7000 Series Methods - Quality Control

Datab	EE10026	EDA 200EA	- Continued
Batcn	SELBUZO -	· EPA 3UUSA	- continuea

Post Spike (5E18026-PS1)					Prepar	ed: 05/18/2015	16:30 Anal	yzed: 05/20/2	2015 11:14		
Source: C505742-01											
Analyte	Result	<u>Flaq</u>	<u>POL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	<u>Note</u>
Cadmium	0.0187		0.00100	mg/L	0.0200	-0.000124	93	80-120			
Calcium	7.63		0.100	mg/L	2.00	5.79	92	80-120			
Copper	0.190		0.0100	mg/L	0.200	0.00201	94	80-120			
Lead	0.198		0.0100	mg/L	0.200	-0.000677	99	80-120			
Magnesium	4.16		0.100	mg/L	2.00	2.27	95	80-120			
Nickel	0.192		0.0100	mg/L	0.200	0.000347	96	80-120			
Potassium	12.0		0.500	mg/L	10.0	2.36	97	80-120			
Sodium	16.5		0.500	mg/L	10.0	7.07	95	80-120			
Zinc	0.200		0.0100	mg/L	0.200	0.00366	98	80-120			

### Batch 5E18026 - EPA 3005A

				Prepare	ed: 05/18/201	5 16:30 Anal	yzed: 05/20/	2015 10:48		
<b>Result</b> 1.60	<u>Flaq</u> U	<b>POL</b> 10.0	<u>Units</u> ug/L	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	<u>Notes</u>
				Prepare	ed: 05/18/201	5 16:30 Anal	yzed: 05/20/	2015 10:54		
<b><u>Result</u></b> 1.60	<u>Flaq</u> U	<b>POL</b> 10.0	<u>Units</u> ug/L	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	<u>Notes</u>
			<i>J.</i>	Prepare	ed: 05/18/201	5 16:30 Anal	yzed: 05/20/	2015 11:03		
Result	<u>Flaq</u>	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	<u>Notes</u>
190		10.0	ug/L		ed: 05/18/201			2015 11:09		
Result 190	<u>Flaq</u>	<b>POL</b> 10.0	<u>Units</u> ug/L	Spike Level 200	Source Result 2.01	<b>%REC</b> 94	<b>%REC</b> <u>Limits</u> 75-125	RPD	RPD <u>Limit</u>	<u>Notes</u>
D1)				Prepare	ed: 05/18/201	5 16:30 Anal	yzed: 05/20/	2015 11:11		
<u>Result</u>	Flag	<u>POL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	<u>Notes</u>
190		10.0	ug/L						20	
				РГерап	ed. 05/16/201	5 10.30 Aliai	yzeu. 05/20/	2015 11.14		
<u>Result</u>	Flag	<u>POL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
	Result 1.60  Result 198  Result 190  D1)	Result   Flaq   1.60   U	Result   Flaq   POL     1.60   U   10.0     Result   Flaq   POL     198   10.0     Result   Flaq   POL     190   10.0     Result   Flaq   POL     190   10.0	Result   Flaq   POL   Units	Result         Flaq         POL         Units         Spike Level           1.60         U         10.0         ug/L         Prepar           Result         Flaq         POL         Units         Spike Level           1.60         U         10.0         ug/L         Spike Level           198         10.0         ug/L         200           Prepar           Result         Flaq         POL         Units         Level           190         10.0         ug/L         200           Prepar           Result         Flaq         POL         Units         Level           190         10.0         ug/L         200           Prepar           Result         Flaq         POL         Units         Level           190         10.0         ug/L         200           Prepar           Spike         Level         200           Prepar	Result         Flag         POL         Units         Spike Level         Source Result           1.60         U         10.0         ug/L         Prepared: 05/18/201           Result         Flag         POL         Units         Level         Source Result           1.60         U         10.0         ug/L         Spike Level         Source Result           198         10.0         ug/L         200         Prepared: 05/18/201           Result         Flag         POL         Units         Level         Result           190         10.0         ug/L         200         2.01           D1)         Prepared: 05/18/201           Result         Flag         POL         Units         Level         Result           190         10.0         ug/L         200         2.01           Prepared: 05/18/201         Prepared: 05/18/201         2.01         Prepared: 05/18/201	Result         Flag         POL         Units         Spike Level         Source Result         %REC           Result         Flag         POL         Units         Spike Level         Source Result         %REC           1.60         U         10.0         ug/L         Prepared: 05/18/2015 16:30 Anal           Result         Flag         POL         Units         Level Result         %REC           198         10.0         ug/L         200         99           Prepared: 05/18/2015 16:30 Anal           Result         Flag         POL         Units         Level Result         %REC           190         10.0         ug/L         200         2.01         94           D1)         Prepared: 05/18/2015 16:30 Anal           Result         Flag         POL         Units         Level Result         %REC           190         10.0         ug/L         200         2.01         94           D1)         Prepared: 05/18/2015 16:30 Anal         Prepared: 05/18/2015 16:30 Anal         Prepared: 05/18/2015 16:30 Anal	Result         Flaq         POL         Units         Spike Level         Source Result         %REC Limits           1.60         U         10.0         ug/L         Prepared: 05/18/2015 16:30 Analyzed: 05/20/           Result         Flaq         POL         Units         Spike Level         Source Result         %REC Limits           1.60         U         10.0         ug/L         Prepared: 05/18/2015 16:30 Analyzed: 05/20/           Result         Flaq         POL         Units         Level Result         %REC Limits           198         10.0         ug/L         200         99         80-120           Prepared: 05/18/2015 16:30 Analyzed: 05/20/           Result         Flaq         POL         Units         Level Result         %REC Limits           190         10.0         ug/L         200         2.01         94         75-125           D1)         Prepared: 05/18/2015 16:30 Analyzed: 05/20/           Result         Flaq         POL         Units         Level Result         %REC Limits           190         10.0         ug/L         200         2.01         94         75-125           Prepared: 05/18/2015 16:30 Analyzed: 05/20/ <td< td=""><td>  Result   Flaq   POL   Units   Level   Result   %REC   Limits   RPD    </td><td>  Result   Flaq   POL   Units   Spike   Source   Result   %REC   Limits   RPD   Limit    </td></td<>	Result   Flaq   POL   Units   Level   Result   %REC   Limits   RPD	Result   Flaq   POL   Units   Spike   Source   Result   %REC   Limits   RPD   Limit

Batch 5E08009 - NO PREP



Batch 5E08009 - NO PREP -	Continued										
Blank (5E08009-BLK1)					Prepare	ed: 05/08/201	5 09:38 Anal	yzed: 05/08/	2015 12:54		
					Spike	Source		%REC		RPD	
<u>Analyte</u>	Result	<u>Flaq</u>	<u>PQL</u>	<u>Units</u>	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Note
Total Alkalinity as CaCO3	14	U	15	mg/L							
LCS (5E08009-BS1)					Prepare	ed: 05/08/201	5 09:38 Anal	yzed: 05/08/	2015 12:55		
<u>Analyte</u>	<u>Result</u>	Flag	POL	<u>Units</u>	Spike Level	Source	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Not
Fotal Alkalinity as CaCO3	100	1144	15	mg/L	100	<u>Result</u>	101	80-120	KFD	Lillie	1100
Matrix Spike (5E08009-MS1)	100			9/ =		ed: 05/08/201			2015 12:56		
Source: C504821-01						,,		,,			
5541661 655 1022 62					Spike	Source		%REC		RPD	
Analyte	Result	Flag	PQL	Units	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Not
Total Alkalinity as CaCO3	14	J	15	mg/L	37.8	14 U		80-120			QM-
Matrix Spike Dup (5E08009-M	SD1)				Prepare	ed: 05/08/201	5 09:38 Anal	yzed: 05/08/	2015 12:58		
Source: C504821-01					Cuille	<b>6</b>		0/ PEC		DDD	
<u>Analyte</u>	Result	Flag	PQL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Not
Total Alkalinity as CaCO3	15		15	mg/L	37.8	14 U	39	80-120		25	QM-
Batch 5E13001 - NO PREP											
Blank (5E13001-BLK1)					Prepare	ed: 05/13/201	5 07:21 Anal	vzed: 05/13/	2015 09:05		
Diamit (DE13001 DERE)					Перин	03/13/201	5 07.217 (IId)	y 200. 03/13/	2013 03.03		
					Spike	Source		%REC		RPD	
Analyte	Result	<u>Flaq</u>	POL	<u>Units</u>	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Not
Ammonia as N	0.045	U	0.10	mg/L		1 05/42/204	5 0 7 24 A . I	1.05/42/	2045 00 07		
LCS (5E13001-BS1)					Prepare	ed: 05/13/201	5 07:21 Anai	yzea: 05/13/.	2015 09:07		
					Spike	Source		%REC		RPD	
Analyte	Result	Flag	PQL	Units	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Not
Ammonia as N	0.98		0.10	mg/L	0.997		99	90-110			
Matrix Spike (5E13001-MS1)					Prepare	ed: 05/13/201	5 07:21 Anal	yzed: 05/13/	2015 09:09		
Source: C402499-01					a "	_		0/ 850			
<u>Analyte</u>	Result	Flag	PQL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Not
Ammonia as N	0.58		0.10	mg/L	0.387	0.23	91	90-110		<u></u>	· · · · · ·
Matrix Spike (5E13001-MS2)					Prepare	ed: 05/13/201	5 07:21 Anal	yzed: 05/13/	2015 09:17		
Source: C503988-01											
<u>Analyte</u>	Result	Flag	POL	<u>Units</u>	Spike	Source	0/ DEC	%REC	RPD	RPD	Nat
Ammonia as N	150	riay	10		<b>Level</b> 39.8	Result 120	<b>%REC</b> 85	<u>Limits</u> 90-110	KPD	<u>Limit</u>	<u>Not</u> QM-
Matrix Spike Dup (5E13001-M			10	mg/L		ed: 05/13/201			2015 00-13		QIVI-
					riepait	.u. 0 <i>3</i> /13/201	5 07.21 Aildi	y26u, 03/13/.	2013 03.13		
Source: C402499-01					Spike	Source		%REC		RPD	
Analyte	Result	Flag	PQL	Units	Level	Result	%REC	Limits	RPD	<u>Limit</u>	Not



Batch 5E13007 - NO PREP	- Continued										
Blank (5E13007-BLK1)					Prepare	ed & Analyzed	: 05/13/2015	13:15			
					Spike	Source		%REC		RPD	
<u>nalyte</u>	Result	<u>Flaq</u>	<u>PQL</u>	<u>Units</u>	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Note
lloride	2.2	U	5.0	mg/L							
lfate as SO4  LCS (5E13007-BS1)	2.9	U	5.0	mg/L	Prenare	ed & Analyzed	. 05/13/2015	12.58			
165 (511507 251)					Терин	ca & Anaryzea	. 05/15/2015	12.50			
nalyt <u>e</u>	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Note
ıloride	53		5.0	mg/L	50.0	Result	106	90-110	I.I. 2	<u> </u>	11010
Ifate as SO4	51		5.0	mg/L	50.0		101	90-110			
Matrix Spike (5E13007-MS2)					Prepare	ed & Analyzed	: 05/14/2015	05:19			
Source: C505175-01					o "	-		0/ 850			
nalyte	Result	Flag	PQL	Units	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Note
loride	73		5.0	mg/L	20.0	51	112	90-110			QM-0
Matrix Spike (5E13007-MS3)					Prepare	ed & Analyzed	: 05/13/2015	14:43			
Source: C504888-02RE1					o "	-		0/ 850			
nalyte	Result	Flag	PQL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	<u>Note</u>
loride	710		50	mg/L	200	480	119	90-110			QM-0
Ifate as SO4	340		50	mg/L	200	130	102	90-110			
Matrix Spike (5E13007-MS4)					Prepare	ed & Analyzed	: 05/13/2015	15:18			
Source: C505175-01RE1					Spike	Source		%REC		RPD	
<u>nalyte</u>	Result	Flag	PQL	<u>Units</u>	Level	Result	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Note
lfate as SO4	1600		100	mg/L	400	1100	114	90-110			QM-0
Matrix Spike Dup (5E13007-N	ISD3)				Prepare	ed & Analyzed	: 05/13/2015	15:01			
Source: C504888-02RE1					Spike	Source		%REC		RPD	
<u>nalyte</u>	Result	Flag	<u>PQL</u>	<u>Units</u>	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	<u>Note</u>
loride	700		50	mg/L	200	480	112	90-110	2	10	QM-0
lfate as SO4	330		50	mg/L	200	130	100	90-110	1	10	
assical Chemistry Parameters	(Dissolved) -	Quality	Control								
Batch 5E19004 - NO PREP											
Blank (5E19004-BLK1)					Prepare	ed: 05/19/201	5 08:25 Anal	yzed: 05/19/	2015 16:44		
					Spike	Source		%REC		RPD	
nalyte otal Organic Carbon	Result	<u>Flaq</u>	<u>PQL</u>	<u>Units</u>	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Note
LCS (5E19004-BS1)	0.34	U	1.0	mg/L	Prepare	ed: 05/19/201	5 08:25 Anal	yzed: 05/19/	2015 16:44		
<u>nalyte</u>	Result	Flag	PQL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Note
_						<u>icouit</u>					



### Classical Chemistry Parameters (Dissolved) - Quality Control

	Batch 5E19004 - NO PREP - ( Matrix Spike (5E19004-MS1)	Jontinuea				Prepare	ed: 05/19/201	5 08:25 Anal	yzed: 05/19/	2015 16:44		
	Source: A502833-01											
Ana	<u>lyte</u>	Result	Flag	PQL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Total	Organic Carbon	54		1.0	mg/L	40.0	6.9	119	85-115			QM-07
	Matrix Spike Dup (5E19004-MS	D1)				Prepare	ed: 05/19/201	5 08:25 Anal	yzed: 05/19/	2015 16:44		
	Source: A502833-01											
	h.a.	DIt	FI	DOL	1124	Spike	Source		%REC		RPD	
Ana	iyte	Result	Flag	PQL	<u>Units</u>	Level	Result	%REC	<u>Limits</u>	RPD	<u>Limit</u>	<u>Notes</u>
Total	Organic Carbon	56		1.0	mg/L	40.0	6.9	124	85-115	3	21	QM-07



### **FLAGS/NOTES AND DEFINITIONS**

- **B** The analyte was detected in the associated method blank.
- **D** The sample was analyzed at dilution.
- The reported value is between the laboratory method detection limit (MDL) and the laboratory method reporting limit (MRL), adjusted for actual sample preparation data and moisture content, where applicable.
- **U** The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
- **E** The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate.
- MRL Method Reporting Limit. The MRL is roughly equivalent to the practical quantitation limit (PQL) and is based on the low point of the calibration curve, when applicable, sample preparation factor, dilution factor, and, in the case of soil samples, moisture content.
- **ND** The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
- **N** The analysis indicates the presence of an analyte for which there is presumptive evidence (85% or greater confidence) to make a "tentative identification".
- **P** Greater than 25% concentration difference was observed between the primary and secondary GC column. The lower concentration is reported.
- **QM-05** The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.
- **QM-07** The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS recovery.



Orlando, FL 32824 10775 Central Port Dr.

## ENVIRONMENTAL CONSERVATION LABORATORIES CHAIN-OF-CUSTODY RECORD 102-A Woodwinds Industrial Ct.

4810 Executive Park Court, Suite 211 Jacksonville, FL 32216-6069

Cary, NC 27511

www.encolabs.com

Project Num	ber		A PARTY OF THE PARTY OF T	ide	,Pb,Z		equested /	unalyses	Requested Turnaround Times
-	+Creek	Water G	wall ty	Chlor 300	Ja, Ni,			vlozzk	Note: Rush requests subject to acceptance by the facility
	Info		C			100	00	BD	Standard
Re	icy Scott		200				e 31	1310	Expedited
Billing Conta	C						fat	CSM	Due//_
Site Location	1 / Time Zone						Sul	<b>2</b> TO	Lab Workorder
					Pre	servation (S	ee Codes)	Combine as necessary)	() 1
Collection Ion Date Time	Comp / Grab	Matrix (see codes)	Total # of Containers						Sample Comments
		N N	6	1	1	1	1	/	
		SZ	6	/	-	/	1	/	
	Ü	SX	6	1	1	~	1	1	
To the second									
				< Total #	of Contai	ners		1	
	JISH BY A CO	\$		inl B	e/lime	-	Received E	200	5-4-15 15)
Relinqu	Jished By		,	Dat	e/Time		Received E	9	Date/Time
Relinqu	ished By			Dat	e/Time		Received E	34	Date/Time
Cooler	#'s & Temps on Rece	ipt						4.00	Condition Upon Receipt  Acceptable  Unacceptable
	Client Name Time Catena Group Address Address Address Address The Catena Group Hi IVS borough NC 27278 Sampler(s) Name, Affiliation (Print)  Sampler(s) Signature NC 210  Sampler(s) Signature NC 20  SP 1555  SP 1555  SP 1555  SP 1555  SP 1555  SP 1555  AC 50 51715  J 3.75  Sample Kit Prepared By  Contents  Collection Time Collection Time Project Nam Billing Conta SIT 15  Site Location Time Time Project Nam Billing Conta Site Location SIT 15  SP 1555  SP 1555  SP 1555  SP 1555  Rejording Conta  Collection Time Rejing Contents  April Site Location Time Time Rejing Contents Rejing Cooler  Cooler  Cooler  Rejing Cooler	Project Number  Project Name/Desc  Surft(  Po#/Billing Contact  Nancy  Billing Contact  Time  Collection  Time  Relinquished B  Relinquished B  Relinquished B  Relinquished B	Project Number  Project Name/Desc  Surft(  Po#/Billing Contact  Nancu  Billing Contact  Time  Collection  Time  Relinquished B  Relinquished B  Relinquished B  Relinquished B	Project Number  Project Name Desc.  Project Name Desc.  Project Name Contact  Nancy Scott  Billing Contact  Site Location / Time Zone  Site Location / Time	Project Name/Desc Project Name	Project Name Desc.  Project Name Desc.  Such Free Water Quality  Reporting Contact  Nancy Scott  Billing Contact  Site Location / Time Zone  Sww. 6  Sww. 6  Alka monormal  Alka monormal  Relinquished By  Relinquished By  Contact Brown Receipt  Date/Time	Project Name Desc.  Project Name Desc.  Such Free L Wat et Quality  Reporting Contact  Nancy Scott  Billing Contact  Site Location / Time Zone  SW W W W W W W W W W W W W W W W W W W	Project Name Desc.  Project Name Desc.  Such Free L Water Quality  Reporting Contact  Nancy Scott  Billing Contact  Site Location / Time Zone  SW  SW  Government  AIX  AIX  AIX  AIX  AIX  AIX  AIX  AI	Project Number  Project Name Descriptions  Proje

### Sample Preservation Verification

### **ENCO Cary**



Work Order:

C505742

The Catena Group (TH015)

Logged In:

07-May-15 15:55

Project:

Swift Creek Water Quality

Project #:

[none]

Logged By:

Andrew S Coons

### C505742-01

Client:

Cont	Туре	Pres (pH) Requirement	pH Checked / In Control	pH Adjusted	Date/Time Adjusted	Reagent Used/Comments
С	250mLP+H2SO4	<2 (	YININA	Y /(N) NA		
D	250mLP+HNO3	<2	Y / N / NA	Y (N) / NA		

### C505742-02

Cont	Туре	Pres (pH) Requirement	pH Checked / In Control	pH Adjusted	Date/Time Adjusted	Reagent Used/Comments
С	250mLP+H2SO4	<2	Y / N / NA	YONINA		
D	250mLP+HNO3	<2 (	YININA	Y /(N) / NA		

### C505742-03

Cont	Туре	Pres (pH) Requirement	pH Checked / In Control	pH Adjusted	Date/Time Adjusted	Reagent Used/Comments
С	250mLP+H2SO4	<2	Y) N / NA	Y /N/ NA		
D	250mLP+HNO3 .	<2	YNNA	Y / N / NA		

	Reagent Name	ID
1		
2		

Reagent Name	ID
	<del>Manager and Allerton Constitutions and the Constitution of the Co</del>

	Reagent Name	ID ID
5		
6		

102-A Woodwinds Industrial Court Cary NC, 27511

Phone: 919.467.3090 FAX: 919.467.3515

Tuesday, June 23, 2015
The Catena Group (TH015)
Attn: Nancy Scott
410-B Millstone Drive
Hillsborough, NC 27278

RE: Laboratory Results for

Project Number: [none], Project Name/Desc: Swift Creek Water Quality

ENCO Workorder(s): C505697

Dear Nancy Scott,

Enclosed is a copy of your laboratory report for test samples received by our laboratory on Tuesday, June 9, 2015.

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. Results for these procedures apply only to the samples as submitted.

The analytical results contained in this report are in compliance with NELAC standards, except as noted in the project narrative. This report shall not be reproduced except in full, without the written approval of the Laboratory.

This report contains only those analyses performed by Environmental Conservation Laboratories. Unless otherwise noted, all analyses were performed at ENCO Cary. Data from outside organizations will be reported under separate cover.

If you have any questions or require further information, please do not hesitate to contact me.

Sill Scatt

Sincerely,

Bill Scott

Project Manager

Enclosure(s)



### SAMPLE SUMMARY/LABORATORY CHRONICLE

Client ID: NC-210		Lab ID:	C505697-01	Sampled:	06/09/15	12:05	Received:	06/09/15 14:3	0
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	/Time(s)		Analysis Date/	Time(s)		
EPA 300.0	07/07/15		06/11/15	08:53		06/11/15 14:29			
EPA 310.2	06/23/15		06/15/15	07:48		06/15/15 09:22			
EPA 350.1	07/07/15		06/17/15	10:24		06/17/15 12:43			
EPA 6010C	12/06/15		06/15/15	11:10		06/18/15 13:46			
SM 5310B-2000	07/07/15		06/18/15	11:15		06/18/15 12:09			
Client ID: SR-1555		Lab ID:	C505697-02	Sampled:	06/09/15	12:45	Received:	06/09/15 14:3	0
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	e/Time(s)		Analysis Date/	Time(s)		
EPA 300.0	07/07/15		06/11/15	08:53		06/11/15 14:46			
EPA 310.2	06/23/15		06/15/15	07:48		06/15/15 08:54			
EPA 350.1	07/07/15		06/17/15	10:24		06/17/15 12:45			
EPA 6010C	12/06/15		06/15/15	11:10		06/18/15 13:49			
SM 5310B-2000	07/07/15		06/18/15	11:15		06/18/15 12:09			
Client ID: NC-50		Lab ID:	C505697-03	Sampled:	06/09/15	13:25	Received:	06/09/15 14:3	0
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	e/Time(s)		Analysis Date/	Time(s)		
EPA 300.0	07/07/15		06/11/15	08:53		06/11/15 15:03			
EPA 310.2	06/23/15		06/15/15	07:48		06/15/15 08:57			
EPA 350.1	07/07/15		06/17/15	10:24		06/17/15 12:47			
EPA 6010C	12/06/15		06/15/15	11:10		06/18/15 13:51			
SM 5310B-2000	07/07/15		06/18/15	11:15		06/18/15 12:09			
Client ID: NC-210 Dissolved		Lab ID:	C505697-04	Sampled:	06/09/15	12:05	Received:	06/09/15 14:3	0
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	e/Time(s)		Analysis Date/	Time(s)		
EPA 6010C	12/06/15		06/15/15	11:10		06/18/15 13:54			
Client ID: SR-1555 Dissolved		Lab ID:	C505697-05	Sampled:	06/09/15	12:45	Received:	06/09/15 14:3	0
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	e/Time(s)		Analysis Date/	Time(s)		
EPA 6010C	12/06/15		06/15/15	11:10		06/18/15 13:56			
Client ID: NC-50 Dissolved		Lab ID:	C505697-06	Sampled:	06/09/15	13:25	Received:	06/09/15 14:3	0
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	e/Time(s)		Analysis Date/	Time(s)		
EPA 6010C	12/06/15		06/15/15	11:10		06/18/15 13:59			



### **SAMPLE DETECTION SUMMARY**

Client ID: NC-210			Lab ID:	C505697-01			
<u>Analyte</u>	<u>Results</u>	<u>Flag</u>	<u>MDL</u>	<u>PQL</u>	<u>Units</u>	<u>Method</u>	<u>Notes</u>
Cadmium - Total	0.360	J	0.360	1.00	ug/L	EPA 6010C	
Calcium - Total	7030	В	39.0	100	ug/L	EPA 6010C	QB-01
Chloride	7.5		2.2	5.0	mg/L	EPA 300.0	
Copper - Total	1.74	J	1.60	10.0	ug/L	EPA 6010C	
Magnesium - Total	2490		29.0	100	ug/L	EPA 6010C	
Potassium - Total	2310		150	500	ug/L	EPA 6010C	
Sodium - Total	8030		400	500	ug/L	EPA 6010C	
Sulfate as SO4	3.3	J	2.9	5.0	mg/L	EPA 300.0	
Total Alkalinity as CaCO3	23		14	15	mg/L	EPA 310.2	
Total Organic Carbon - Dissolved	4.3		0.34	1.0	mg/L	SM 5310B-2000	
Client ID: SR-1555			Lab ID:	C505697-02			
<u>Analyte</u>	Results	<u>Flag</u>	MDL	<u>PQL</u>	<u>Units</u>	<u>Method</u>	<u>Notes</u>
Calcium - Total	6870	В	39.0	100	ug/L	EPA 6010C	QB-01
Chloride	7.2		2.2	5.0	mg/L	EPA 300.0	
Copper - Total	1.69	J	1.60	10.0	ug/L	EPA 6010C	
Magnesium - Total	2180		29.0	100	ug/L	EPA 6010C	
Nickel - Total	2.02	J	1.80	10.0	ug/L	EPA 6010C	
Potassium - Total	2080		150	500	ug/L	EPA 6010C	
Sodium - Total	8520		400	500	ug/L	EPA 6010C	
Sulfate as SO4	3.2	J	2.9	5.0	mg/L	EPA 300.0	
Total Alkalinity as CaCO3	32		14	15	mg/L	EPA 310.2	
Total Organic Carbon - Dissolved	4.2		0.34	1.0	mg/L	SM 5310B-2000	
Client ID: NC-50			Lab ID:	C505697-03			
<u>Analyte</u>	<u>Results</u>	<u>Flag</u>	MDL	<u>PQL</u>	<u>Units</u>	<u>Method</u>	<u>Notes</u>
Ammonia as N	0.072	J	0.045	0.10	mg/L	EPA 350.1	
Calcium - Total	8180	В	39.0	100	ug/L	EPA 6010C	QB-01
Chloride	9.9		2.2	5.0	mg/L	EPA 300.0	
Copper - Total	5.53	J	1.60	10.0	ug/L	EPA 6010C	
Magnesium - Total	2400		29.0	100	ug/L	EPA 6010C	
Potassium - Total	2990		150	500	ug/L	EPA 6010C	
Sodium - Total	8240		400	500	ug/L	EPA 6010C	
Sulfate as SO4	4.1	J	2.9	5.0	mg/L	EPA 300.0	
Total Alkalinity as CaCO3	30		14	15	mg/L	EPA 310.2	
Total Organic Carbon - Dissolved	5.9		0.34	1.0	mg/L	SM 5310B-2000	
Zinc - Total	16.7		3.80	10.0	ug/L	EPA 6010C	
Client ID: NC-210 Dissolved			Lab ID:	C505697-04			
<u>Analyte</u>	Results	<u>Flag</u>	MDL	<u>PQL</u>	<u>Units</u>	<u>Method</u>	<u>Notes</u>
Copper - Dissolved	1.66	J	1.60	10.0	ug/L	EPA 6010C	_
Client ID: NC-50 Dissolved			Lab ID:	C505697-06			
<u>Analyte</u>	Results	Flag	MDL	PQL	<u>Units</u>	Method	<u>Notes</u>
Copper - Dissolved	2.79	J	1.60	10.0	ug/L	EPA 6010C	



### **ANALYTICAL RESULTS**

**Description:** NC-210 **Lab Sample ID:** C505697-01 **Received:** 06/09/15 14:30

**Matrix:** Water **Sampled:** 06/09/15 12:05

Project: Swift Creek Water Quality Sampled By: Nancy Scott

### Metals (total recoverable) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	MDL	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Cadmium [7440-43-9]^	0.360	J	ug/L	1	0.360	1.00	5F15026	EPA 6010C	06/18/15 13:46	JDH	
Calcium [7440-70-2]^	7030	В	ug/L	1	39.0	100	5F15026	EPA 6010C	06/18/15 13:46	JDH	QB-01
Copper [7440-50-8]^	1.74	J	ug/L	1	1.60	10.0	5F15026	EPA 6010C	06/18/15 13:46	JDH	
Lead [7439-92-1]^	ND		ug/L	1	3.10	10.0	5F15026	EPA 6010C	06/18/15 13:46	JDH	
Magnesium [7439-95-4]^	2490		ug/L	1	29.0	100	5F15026	EPA 6010C	06/18/15 13:46	JDH	
Nickel [7440-02-0]^	ND		ug/L	1	1.80	10.0	5F15026	EPA 6010C	06/18/15 13:46	JDH	
Potassium [7440-09-7]^	2310		ug/L	1	150	500	5F15026	EPA 6010C	06/18/15 13:46	JDH	
Sodium [7440-23-5]^	8030		ug/L	1	400	500	5F15026	EPA 6010C	06/18/15 13:46	JDH	
Zinc [7440-66-6]^	ND		ug/L	1	3.80	10.0	5F15026	EPA 6010C	06/18/15 13:46	JDH	

### **Classical Chemistry Parameters**

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	<u>MDL</u>	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Ammonia as N [7664-41-7]^	ND		mg/L	1	0.045	0.10	5F17014	EPA 350.1	06/17/15 12:43	SHA	
Chloride [16887-00-6]^	7.5		mg/L	1	2.2	5.0	5F11013	EPA 300.0	06/11/15 14:29	AJB	
Sulfate as SO4 [14808-79-8]^	3.3	J	mg/L	1	2.9	5.0	5F11013	EPA 300.0	06/11/15 14:29	AJB	
Total Alkalinity as CaCO3 [471-34-1]^	23		mg/L	1	14	15	5F15009	EPA 310.2	06/15/15 09:22	SHA	

### Classical Chemistry Parameters (Dissolved)

^ - ENCO Orlando certified analyte [NC 424]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Total Organic Carbon^	43		ma/l	1	0.34	1.0	5F18004	SM 5310R-2000	06/18/15 12:09	RSΔ	



### **ANALYTICAL RESULTS**

**Description:** SR-1555 **Lab Sample ID:** C505697-02 **Received:** 06/09/15 14:30

**Matrix:** Water **Sampled:** 06/09/15 12:45

Project: Swift Creek Water Quality Sampled By: Nancy Scott

### Metals (total recoverable) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	<u>Flag</u>	<u>Units</u>	<u>DF</u>	<u>MDL</u>	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<b>Analyzed</b>	<u>By</u>	<u>Notes</u>
Cadmium [7440-43-9]^	ND		ug/L	1	0.360	1.00	5F15026	EPA 6010C	06/18/15 13:49	JDH	
Calcium [7440-70-2]^	6870	В	ug/L	1	39.0	100	5F15026	EPA 6010C	06/18/15 13:49	JDH	QB-01
Copper [7440-50-8]^	1.69	J	ug/L	1	1.60	10.0	5F15026	EPA 6010C	06/18/15 13:49	JDH	
Lead [7439-92-1]^	ND		ug/L	1	3.10	10.0	5F15026	EPA 6010C	06/18/15 13:49	JDH	
Magnesium [7439-95-4]^	2180		ug/L	1	29.0	100	5F15026	EPA 6010C	06/18/15 13:49	JDH	
Nickel [7440-02-0]^	2.02	J	ug/L	1	1.80	10.0	5F15026	EPA 6010C	06/18/15 13:49	JDH	
Potassium [7440-09-7]^	2080		ug/L	1	150	500	5F15026	EPA 6010C	06/18/15 13:49	JDH	
Sodium [7440-23-5]^	8520		ug/L	1	400	500	5F15026	EPA 6010C	06/18/15 13:49	JDH	
Zinc [7440-66-6]^	ND		ug/L	1	3.80	10.0	5F15026	EPA 6010C	06/18/15 13:49	JDH	

### **Classical Chemistry Parameters**

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Ammonia as N [7664-41-7]^	ND		mg/L	1	0.045	0.10	5F17014	EPA 350.1	06/17/15 12:45	SHA	
Chloride [16887-00-6]^	7.2		mg/L	1	2.2	5.0	5F11013	EPA 300.0	06/11/15 14:46	AJB	
Sulfate as SO4 [14808-79-8]^	3.2	J	mg/L	1	2.9	5.0	5F11013	EPA 300.0	06/11/15 14:46	AJB	
Total Alkalinity as CaCO3 [471-34-1]^	32		mg/L	1	14	15	5F15008	EPA 310.2	06/15/15 08:54	SHA	

### Classical Chemistry Parameters (Dissolved)

^ - ENCO Orlando certified analyte [NC 424]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	<u>MDL</u>	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Total Organic Carbon^	4.2		mg/L	1	0.34	1.0	5F18004	SM 5310B-2000	06/18/15 12:09	RSA	



### **ANALYTICAL RESULTS**

**Description:** NC-50 **Lab Sample ID:** C505697-03 **Received:** 06/09/15 14:30

**Matrix:** Water **Sampled:** 06/09/15 13:25 **Work Order:** C505697

**Project:** Swift Creek Water Quality Sampled By: Nancy Scott

### Metals (total recoverable) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Cadmium [7440-43-9]^	ND		ug/L	1	0.360	1.00	5F15026	EPA 6010C	06/18/15 13:51	JDH	
Calcium [7440-70-2]^	8180	В	ug/L	1	39.0	100	5F15026	EPA 6010C	06/18/15 13:51	JDH	QB-01
Copper [7440-50-8]^	5.53	J	ug/L	1	1.60	10.0	5F15026	EPA 6010C	06/18/15 13:51	JDH	
Lead [7439-92-1]^	ND		ug/L	1	3.10	10.0	5F15026	EPA 6010C	06/18/15 13:51	JDH	
Magnesium [7439-95-4]^	2400		ug/L	1	29.0	100	5F15026	EPA 6010C	06/18/15 13:51	JDH	
Nickel [7440-02-0]^	ND		ug/L	1	1.80	10.0	5F15026	EPA 6010C	06/18/15 13:51	JDH	
Potassium [7440-09-7]^	2990		ug/L	1	150	500	5F15026	EPA 6010C	06/18/15 13:51	JDH	
Sodium [7440-23-5]^	8240		ug/L	1	400	500	5F15026	EPA 6010C	06/18/15 13:51	JDH	
Zinc [7440-66-6]^	16.7		ug/L	1	3.80	10.0	5F15026	EPA 6010C	06/18/15 13:51	JDH	

### **Classical Chemistry Parameters**

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	<u>MDL</u>	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Ammonia as N [7664-41-7]^	0.072	J	mg/L	1	0.045	0.10	5F17014	EPA 350.1	06/17/15 12:47	SHA	
Chloride [16887-00-6]^	9.9		mg/L	1	2.2	5.0	5F11013	EPA 300.0	06/11/15 15:03	AJB	
Sulfate as SO4 [14808-79-8]^	4.1	J	mg/L	1	2.9	5.0	5F11013	EPA 300.0	06/11/15 15:03	AJB	
Total Alkalinity as CaCO3 [471-34-1]^	30		mg/L	1	14	15	5F15008	EPA 310.2	06/15/15 08:57	SHA	

### Classical Chemistry Parameters (Dissolved)

^ - ENCO Orlando certified analyte [NC 424]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	<u>MDL</u>	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Total Organic Carbon^	5.9		mg/L	1	0.34	1.0	5F18004	SM 5310B-2000	06/18/15 12:09	RSA	

**Description:** NC-210 Dissolved **Lab Sample ID:** C505697-04 **Received:** 06/09/15 14:30

**Matrix:** Water **Sampled:** 06/09/15 12:05

Project: Swift Creek Water Quality Sampled By: Nancy Scott

### Metals (Dissolved) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number] Results <u>Flaq</u> **Units** MDL <u>PQL</u> **Batch** Method **Analyzed Notes** By Copper [7440-50-8]^ 1.66 J ug/L 1.60 10.0 5F15026 EPA 6010C 06/18/15 13:54 JDH

**Description:** SR-1555 Dissolved **Lab Sample ID:** C505697-05 **Received:** 06/09/15 14:30

**Matrix:** Water **Sampled:** 06/09/15 12:45 **Work Order:** C505697

Project: Swift Creek Water Quality Sampled By: Nancy Scott

### Metals (Dissolved) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	<u>MDL</u>	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Copper [7440-50-8]^	ND		ug/L	1	1.60	10.0	5F15026	EPA 6010C	06/18/15 13:56	JDH	

**Description:** NC-50 Dissolved **Lab Sample ID:** C505697-06 **Received:** 06/09/15 14:30

**Matrix:** Water **Sampled:** 06/09/15 13:25 **Work Order:** C505697

Project: Swift Creek Water Quality Sampled By: Nancy Scott

### Metals (Dissolved) by EPA 6000/7000 Series Methods

Analyte [CAS Number]	<b>Results</b>	Flag	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Copper [7440-50-8]^	2.79	J	ug/L	1	1.60	10.0	5F15026	EPA 6010C	06/18/15 13:59	JDH	



### Metals (total recoverable) by EPA 6000/7000 Series Methods - Quality Control

### Batch 5F15026 - EPA 3005A

Blank	(5F15026-BLK1)	Prepared: 06/15/2015 11:10 Analyzed: 06/18/2015 12:54

Anal	<u>vte</u>	<u>Result</u>	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Cadm	ium	0.360	U	1.00	ug/L							
Calciu	ım	42.7	J	100	ug/L							
Coppe	er	1.60	U	10.0	ug/L							
Lead		3.10	U	10.0	ug/L							
Magne	esium	29.0	U	100	ug/L							
Nickel		1.80	U	10.0	ug/L							
Potas	sium	150	U	500	ug/L							
Sodiu	m	400	U	500	ug/L							
Zinc		3.80	U	10.0	ug/L							
	LCS (5F15026-BS1)					Prepare	ed: 06/15/201	5 11:10 Anal	yzed: 06/18/2	2015 13:01		

<u>Analyte</u>	Result	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source Result	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Cadmium	19.6		1.00	ug/L	20.0		98	80-120			
Calcium	2180	В	100	ug/L	2000		109	80-120			
Copper	193		10.0	ug/L	200		97	80-120			
Lead	200		10.0	ug/L	200		100	80-120			
Magnesium	2020		100	ug/L	2000		101	80-120			
Nickel	198		10.0	ug/L	200		99	80-120			
Potassium	10500		500	ug/L	10000		105	80-120			
Sodium	9740		500	ug/L	10000		97	80-120			
Zinc	199		10.0	ug/L	200		100	80-120			

Matrix Spike (5F15026-MS1) Prepared: 06/15/2015 11:10 Analyzed: 06/18/2015 13:14

Source: C506306-02											
Analyte	Result	Flag	PQL	Units	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Cadmium	19.2		1.00	ug/L	20.0	0.360 U	96	75-125			
Calcium	21900	В	100	ug/L	2000	19800	105	75-125			
Copper	197		10.0	ug/L	200	1.60 U	99	75-125			
Lead	201		10.0	ug/L	200	3.10 U	101	75-125			
Magnesium	7200		100	ug/L	2000	5090	105	75-125			
Nickel	204		10.0	ug/L	200	5.00	100	75-125			
Potassium	13400		500	ug/L	10000	3080	103	75-125			
Sodium	42600		500	ug/L	10000	31200	114	75-125			
Zinc	201		10.0	ua/L	200	3.80 U	101	75-125			

Matrix Spike Dup (5F15026-MSD1) Prepared: 06/15/2015 11:10 Analyzed: 06/18/2015 13:17

<u>Analyte</u>	Result	Flag	PQL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	<u>Notes</u>
Cadmium	19.3		1.00	ug/L	20.0	0.360 U	96	75-125	0.1	20	
Calcium	21700	В	100	ug/L	2000	19800	91	75-125	1	20	
Copper	195		10.0	ug/L	200	1.60 U	97	75-125	1	20	
Lead	202		10.0	ug/L	200	3.10 U	101	75-125	0.1	20	
Magnesium	7000		100	ug/L	2000	5090	96	75-125	3	20	
Nickel	201		10.0	ug/L	200	5.00	98	75-125	1	20	
Potassium	13200		500	ug/L	10000	3080	101	75-125	2	20	
Sodium	41600		500	ug/L	10000	31200	104	75-125	2	20	
Zinc	200		10.0	ug/L	200	3.80 U	100	75-125	0.6	20	



Batch 5F15026 - EPA 3005A - Co	ontinued	ì
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Post Spike (5F15026-PS1)		Prepared: 06/15/2015 11:10 Analyzed: 06/18/2015 13:41									
Source: C506306-02											
<u>Analyte</u>	<u>Result</u>	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Cadmium	0.0190		0.00100	mg/L	0.0200	-0.000294	95	80-120			
Calcium	21.3	В	0.100	mg/L	2.00	19.8	71	80-120			QM-08
Copper	0.196		0.0100	mg/L	0.200	0.00137	97	80-120			
Lead	0.196		0.0100	mg/L	0.200	0.000683	98	80-120			
Magnesium	6.66		0.100	mg/L	2.00	5.09	79	80-120			QM-08
Nickel	0.199		0.0100	mg/L	0.200	0.00500	97	80-120			
Potassium	14.1		0.500	mg/L	10.0	3.08	110	80-120			
Sodium	42.8		0.500	mg/L	10.0	31.2	117	80-120			
Zinc	0.198		0.0100	mg/L	0.200	0.00284	98	80-120			
Metals (Dissolved) by EPA 6000	)/7000 Series	Method	s - Quality	Control							

### Batch 5F15026 - EPA 3005A

Blank (5F15026-BLK2)	Prepared: 06/15/2015 11:10 Analyzed: 06/18/2015 12:58

Ana	l <u>yte</u>	Result	Flag	POL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Copp	er	1.60	U	10.0	ug/L							
	LCS (5F15026-BS1)					Prepare	ed: 06/15/201	5 11:10 Anal	yzed: 06/18/2	2015 13:01		

<u>Analyte</u>	Result	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Copper	193		10.0	ug/L	200		97	80-120			

Matrix Spike (5F15026-MS1)	Prepared: 06/15/2015 11:10 Analyzed: 06/18/2015 13:14
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Source: C506306-02

Analyte	Result	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Copper	197		10.0	ug/L	200	1.60 U	99	75-125			

 Matrix Spike Dup (5F15026-MSD1)
 Prepared: 06/15/2015 11:10 Analyzed: 06/18/2015 13:17

Source: C506306-02

<u>Analyte</u>	Result	Flag	PQL	<u>Units</u>	Spike Level	Result	%REC	<u>Limits</u>	RPD	Limit	<u>Notes</u>
Copper	195		10.0	ug/L	200	1.60 U	97	75-125	1	20	

**Post Spike (5F15026-PS1)** Prepared: 06/15/2015 11:10 Analyzed: 06/18/2015 13:41

Source: C506306-02

<u>Analyte</u>	Result	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Copper	0.196		0.0100	mg/L	0.200	0.00137	97	80-120			

### Classical Chemistry Parameters - Quality Control

### Batch 5F11013 - NO PREP

lank (5F11013-BLK1)	Prepared: 06/11/2015 08:53 Analyzed: 06/11/2015 11:12
---------------------	---

Analyte	Result	Flag	<u>POL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	<u>Notes</u>
Chloride	2.2	U	5.0	mg/L							
Sulfate as SO4	2.9	U	5.0	mg/L							



Result   Flag   POL   Units   Level   Result   Flag   POL   Units   Level   Result   Source   Source	Note QM-0
Analyte Result Flag POL Units Level Result 9.0 Units Level Result 9.0 (100 90-110 100 100 100 100 100 100 100 100 10	Note
Analyte         Result         Flag         POL         Units         Level         Result         % REC         Limits         RPD         Limits           Chloride         53         5.0         mg/L         50.0         106         90-110         106         90-110         106         90-110         106         90-110         106         90-110         106         90-110         106         90-110         106         90-110         106         90-110         106         90-110         106         90-110         106         90-110         106         90-110         106         90-110         106         90-110         106         106         107-120         106         107-120         106         107-120         106         107-120         106         107-120         106         107-120         106         107-120         106         107-120         106 <th>Note</th>	Note
Chloride   53   5.0   mg/L   50.0   106   90-110   106   50-110	Note
Sulfate as SO4         51         5.0         mg/L         50.0         101         90-110         Head of 1/120 to 1/12	QM-0
Matrix Spike (5F11013-MS1)	QM-0
Source: C506986-02   Source: C506986-02   Source: C506986-02   Source: C506986-02   Source: C506986-02   Source: C502650-01   Source:	QM-0
Analyte         Result         Flad         POL         Units         Spike Level         Source Result         "MREC Limits         RPD Limit           Chloride         45         5.0         mg/L         20.0         23         112         90-110         ————————————————————————————————————	QM-0
Analyte         Result         Flag         POL         Units         Level         Result         %REC         Limits         RPD         Limit           Chloride         45         5.0         mg/L         20.0         23         112         90-110         90-110         11         11         11         12         90-110         11         12         12         90-110         12         12         90-110         12 <td< td=""><td>QM-0</td></td<>	QM-0
Chloride	<u>Note</u>
Matrix Spike (5F11013-MS2)	
Source: C502650-01	
Analyte         Result         Flaq         POL         Units         Spike Level         Source Result Result         %REC Limits         RPD Limit         RPD Limit           Chloride         41         5.0         mg/L         20.0         19         109         90-110         100	
Analyte         Result         Flag         POL         Units         Level         Result         %REC         Limits         RPD         Limit           Chloride         41         5.0         mg/L         20.0         19         109         90-110         100	
Sulfate as SO4     68     5.0     mg/L     20.0     46     112     90-110       Matrix Spike Dup (5F11013-MSD1)       Source: C506986-02       Spike Source Result Spike Source Result Spike Result Resul	QM-0
Matrix Spike Dup (5F11013-MSD1)   Prepared: 06/11/2015 08:53 Analyzed: 06/11/2015 13:04	QM-0
Source: C506986-02   Spike   Source   Spike   Spi	
Analyte         Result         Flag         PQL         Units         Level Level Result Result         %REC Limits RPD Limit         RPD Limit RPD Limit           Chloride         45         5.0         mg/L         20.0         23         111         90-110         0.09         10           Sulfate as SO4         57         5.0         mg/L         20.0         35         108         90-110         0.1         10           Batch 5F15008 - NO PREP           Prepared: 06/15/2015 07:48 Analyzed: 06/15/2015 08:00           Spike Source Result Result Result Was Caccook         %REC Limits RPD Limit           Total Alkalinity as Caccook         14         U         15         mg/L         V	
Result   Flaq   POL   Units   Level   Result   %REC   Limits   RPD   Limit	
Sulfate as SO4         57         5.0         mg/L         20.0         35         108         90-110         0.1         10           Batch 5F15008 - NO PREP         Prepared: 06/15/2015 07:48 Analyzed: 06/15/2015 08:00           Blank (5F15008-BLK1)         Prepared: 06/15/2015 07:48 Analyzed: 06/15/2015 08:00           Analyte         Result         Flag         PQL         Units         Spike         Source         %REC         Limits         RPD         Limit           Total Alkalinity as CaCO3         14         U         15         mg/L         V	<u>Note</u>
Blank (5F15008 - NO PREP	QM-0
Prepared: 06/15/2015 07:48 Analyzed: 06/15/2015 08:00	
Analyte Result Flag POL Units Level Result %REC RPD Limits  Total Alkalinity as CaCO3 14 U 15 mg/L	
Analyte Result Flag POL Units Level Result %REC Limits RPD Limit  Total Alkalinity as CaCO3 14 U 15 mg/L	
Total Alkalinity as CaCO3 14 U 15 mg/L	
	Note
LCS (5F15008-BS1) Prepared: 06/15/2015 07:48 Analyzed: 06/15/2015 08:11	
Spike Source %REC RPD	
Analyte Result Flag PQL Units Level Result %REC Limits RPD Limit	<u>Note</u>
Total Alkalinity as CaCO3 97 15 mg/L 100 97 80-120	
Matrix Spike (5F15008-MS1) Prepared: 06/15/2015 07:48 Analyzed: 06/15/2015 08:54	
Source: C506986-02	
Spike Source %REC RPD	
Analyte Result Flag POL Units Level Result %REC Limits RPD Limit	Note
Total Alkalinity as CaCO3 26 15 mg/L 37.8 14 U 68 80-120	QM-0
Matrix Spike Dup (5F15008-MSD1)         Prepared: 06/15/2015 07:48 Analyzed: 06/15/2015 08:56	
Source: C506986-02	
Spike Source %REC RPD  Analyte Result Flag PQL Units Level Result %REC Limits RPD Limit	<u>Note</u>
Total Alkalinity as CaCO3 23 15 mg/L 37.8 14 U 61 80-120 11 25	QM-0
Batch 5F15009 - NO PREP	



Batch 5F15009 - NO PREP - C	Continued										
Blank (5F15009-BLK1)					Prepare	ed: 06/15/201	5 07:48 Anal	yzed: 06/15/	2015 09:17		
					Spike	Source		%REC		RPD	
<u>Analyte</u>	Result	<u>Flaq</u>	POL	<u>Units</u>	Level	Result	%REC	Limits	RPD	<u>Limit</u>	Note
otal Alkalinity as CaCO3	14	U	15	mg/L							
LCS (5F15009-BS1)					Prepare	ed: 06/15/201	5 07:48 Anal	yzed: 06/15/	2015 09:18		
Analyte	Result	Flag	POL	<u>Units</u>	Spike Level	Source	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Note
otal Alkalinity as CaCO3	95	1104	15	mg/L	100	<u>Result</u>	95	80-120	KFD	Lillie	1100
Matrix Spike (5F15009-MS1)			13	9/ _		ed: 06/15/201			2015 10:01		
Source: C504935-01RE1						,,		,			
					Spike	Source		%REC		RPD	
Analyte	Result	Flag	PQL	Units	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Note
otal Alkalinity as CaCO3	25		15	mg/L	37.8	14 U	66	80-120			QM-
Matrix Spike Dup (5F15009-MSi	D1)				Prepare	ed: 06/15/201	5 07:48 Anal	yzed: 06/15/	2015 10:03		
Source: C504935-01RE1					Cuilco	Cauraa		0/ DEC		RPD	
<u>Analyte</u>	Result	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	Limit	Not
otal Alkalinity as CaCO3	27		15	mg/L	37.8	14 U	72	80-120	9	25	QM-
Batch 5F17014 - NO PREP											
Blank (5F17014-BLK1)					Prepare	ed: 06/17/201	5 10:24 Anal	yzed: 06/17/	2015 12:28		
					Spike	Source		%REC		RPD	
<u>Analyte</u>	Result	<u>Flaq</u>	POL	<u>Units</u>	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Note
Ammonia as N	0.045	U	0.10	mg/L							
LCS (5F17014-BS1)					Prepare	ed: 06/17/201	5 10:24 Anal	yzed: 06/17/	2015 12:30		
Analyte	Result	Flag	POL	Units	Spike Level	Source Result	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Not
Ammonia as N	1.1		0.10	mg/L	0.997	Kesuit	105	90-110		<u></u>	
Matrix Spike (5F17014-MS1)				5,		ed: 06/17/201	5 10:24 Anal		2015 12:32		
						, , .		,, ,			
Source: C402500-01						_		%REC		RPD	
Source: C402500-01					Spike	Source		JOREC		<u>Limit</u>	Not
Source: C402500-01	Result	Flag	POL	<u>Units</u>	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD		
	<b>Result</b> 0.41	<u>Flaq</u>	<b>POL</b> 0.10	<u>Units</u> mg/L	-		<b>%REC</b> 87		RPD		QM-
<u>Analyte</u>	·	<u>Flaq</u>			<b>Level</b> 0.387	<u>Result</u>	87	<u>Limits</u> 90-110			QM-
Analyte Ammonia as N	·	Flag			Level 0.387 Prepare	Result 0.070 ed: 06/17/201	87	<u>Limits</u> 90-110 yzed: 06/17/			QM-
Analyte Ammonia as N Matrix Spike (5F17014-MS2)	·	Flag Flag			<b>Level</b> 0.387	Result 0.070 ed: 06/17/201 Source	87	<u>Limits</u> 90-110		RPD <u>Limit</u>	
Analyte Ammonia as N  Matrix Spike (5F17014-MS2)  Source: C502677-01	0.41		0.10	mg/L	Level 0.387 Prepare	Result 0.070 ed: 06/17/201	87 5 10:24 Anal	Limits 90-110 yzed: 06/17/2	2015 12:40	RPD	Note
Analyte Ammonia as N  Matrix Spike (5F17014-MS2)  Source: C502677-01  Analyte	0.41  Result  0.93		0.10	mg/L	Level 0.387 Prepare  Spike Level 0.387	Result 0.070 ed: 06/17/201 Source Result	87 5 10:24 Anal <b>%REC</b> 79	90-110 yzed: 06/17/ %REC Limits 90-110	2015 12:40 <b>RPD</b>	RPD	QM- <u>Not</u> QM-
Analyte Ammonia as N  Matrix Spike (5F17014-MS2)  Source: C502677-01  Analyte  Ammonia as N	0.41  Result  0.93		0.10	mg/L	Level 0.387 Prepare  Spike Level 0.387 Prepare	Result 0.070 ed: 06/17/201 Source Result 0.62 ed: 06/17/201	87 5 10:24 Anal <b>%REC</b> 79	Limits   90-110     yzed: 06/17/	2015 12:40 <b>RPD</b>	RPD <u>Limit</u>	Not
Analyte Ammonia as N  Matrix Spike (5F17014-MS2)  Source: C502677-01  Analyte  Ammonia as N  Matrix Spike Dup (5F17014-MS)	0.41  Result  0.93		0.10	mg/L	Level 0.387 Prepare  Spike Level 0.387	Result 0.070 ed: 06/17/201 Source Result 0.62	87 5 10:24 Anal <b>%REC</b> 79	90-110 yzed: 06/17/ %REC Limits 90-110	2015 12:40 <b>RPD</b>	RPD	Note



Classical Chemistry Parameters (I	Dissolved) -	Quality	Control										
Batch 5F18004 - NO PREP - C	Continued												
Blank (5F18004-BLK1)					Prepared: 06/18/2015 11:15 Analyzed: 06/18/2015 12:09								
Analyte	<u>Result</u>	<u>Flaq</u>	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Note		
otal Organic Carbon	0.34	U	1.0	mg/L									
LCS (5F18004-BS1)					Prepare	ed: 06/18/201	5 11:15 Ana	lyzed: 06/18/	2015 12:09				
Analyte	<u>Result</u>	Flag	<u>POL</u>	<u>Units</u>	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Note		
otal Organic Carbon	37		1.0	mg/L	40.0	resure	93	85-115					
Matrix Spike (5F18004-MS1)					Prepare	ed: 06/18/201	5 11:15 Ana	yzed: 06/18/	2015 12:09				
Source: A503583-02													
Analyte	Result	Flag	POL	Units	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Note		
Total Organic Carbon	49		1.0	mg/L	40.0	8.9	101	85-115					
Matrix Spike Dup (5F18004-MSI	01)				Prepare	ed: 06/18/201	5 11:15 Ana	yzed: 06/18/	2015 12:09				
Source: A503583-02													
<u>livte</u> <u>Result Flag POL</u>			<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Note			
Total Organic Carbon	49		1.0	mg/L	40.0	8.9	101	85-115	0.2	21			



#### **FLAGS/NOTES AND DEFINITIONS**

- **B** The analyte was detected in the associated method blank.
- **D** The sample was analyzed at dilution.
- The reported value is between the laboratory method detection limit (MDL) and the laboratory method reporting limit (MRL), adjusted for actual sample preparation data and moisture content, where applicable.
- **U** The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
- **E** The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate.
- MRL Method Reporting Limit. The MRL is roughly equivalent to the practical quantitation limit (PQL) and is based on the low point of the calibration curve, when applicable, sample preparation factor, dilution factor, and, in the case of soil samples, moisture content.
- **ND** The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
- **N** The analysis indicates the presence of an analyte for which there is presumptive evidence (85% or greater confidence) to make a "tentative identification".
- **P** Greater than 25% concentration difference was observed between the primary and secondary GC column. The lower concentration is reported.
- **QB-01** The method blank had a positive result for the analyte; however, the concentration in the method blank is less than 10% of the sample result, which minimizes the impact of the deviation.
- **QM-05** The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.
- **QM-08** Post-digestion spike did not meet method requirements due to confirmed matrix effects (dilution test).
- **QM-11** Precision between duplicate matrix spikes of the same sample was outside acceptance limits.



10775 Central Port Dr. 4810 Executive Park Court, Suite 111 102-A Woodwinds Industrial Ct.

		Comments/Special Reporting Requirements	Sample Kit Prepared By	A STREET, ST.	国 日本の日本の一部の日本の		ACTUAL OF CONTRACT PRINTS BEGINNESS	The state of the s	The state of the s	Die II Bertand oder der der der der der		THE RESIDENCE OF STREET, SALES OF STREET	NC-50	SR-1555	NC-210 6	Item # Sample ID (Field Identification) C	Sampler(s) Signature Sampler(s) Signature	Tel (919) 417-2732 Fax	Hillsborough, NC 27278	410-B Millstone Drive	The Catena Group (TH015)	Client Name	
An intelligent to			Date/Time				II THE REPORT OF VINE	Se man time to		on cover style		TO DE DESIGNATION AND REAL PROPERTY.		1	0/9/18/1	Collection Date	Site	Rep	The Colon	10 to	DE DA	Proj	Orlando, FL 32824 (407) 826-5314 Fax (407) 850-6945
Cooler #'s &	Relinquished By	Relinquished By	Relinquished By				THE STATE STATE					HE LOWER	1:25	12:45	2.05	Collection	Nancy Scott Site Location / Time Zone	Reporting Contact Nancy Scott		Swift (	[none]	Project Number	ax (407) 850-
Cooler #'s & Temps on Receipt	Ву	-		and the second	patricas		+	Sparson S		A STATE OF		The market		P. State M.		Comp / Grab	Scott	Scott	STATISTICS OF ST	Creek Wa	THE STATE OF	TO THE PARTY OF TH	3945
and delices	Change Sprants	call of their	BEE	Spire & local	O ACTUAL OF		D'anterior	WA	WA	WA	WA	WA	WA	WA	WA	(see codes)	Andrew Communication of the Co	A to the second	THE STREET IN	Swift Creek Water Quality	No like the like	No. of the last of	Jacksonville, FL 32216-6069 (904) 296-3007 Fax (904) 296-6210
200	Tankadamatra Managaran	The Parties			HAN MAN		Wiles Seither	6	6	6	6	6	6	o o	6	Total # of Containers		on Company of the Com	Service and States	A SPECIAL D	Di calles di	C. Marie Control of the Control	Fax (904) 296-62
Section 1	D	D	6	< Total # of Containers				×	×	×	×	×	×	×	×	100	Alkalinity 3	10.2,0	Chlo	ride 30	00		10 1000
No.	Date/Time	Date/Time	bate/Time	# of Cor			100	×	×	×	×	×	×	×	×	DOM: NO	Ammonia	a 350	.1		1		
かりた		Bug Da	152	ntainers				×	×	×	×	×	×	×	×	90	Ca,Cd,Cu,	K,Mg,	Na,N	Ni,Pb,2	Zn		(91
N	B		2:30 Ho					×	×	×	×	×	×	×	×	01	Ca,Cd,Cu, Cu/F Sulfate 3	No.		THE PERSON NAMED IN	1	Requ	(919) 467-3090
	Received By	Received By	Received By	and the same	70.00	= 13	1000	×	×	×	×	×	×	×	×			1				Requested Analyses	(919) 467-3090 Fax (919) 467-3515
Section 1	MM	No. 200		10000			Luci Bull	×	×	×	×	×	×	×	×		TOC SM	5310E	3 Dis	solve	d	alyses	19) 467-38
(Salitate to	AM	destroy to		Mary July			Shrugara	and lotte		TOWN TO SE				2		uni				1528			515
Condition Upon Receipt		The second to the second		S Principal State of the second	No. of Persons in Contract of the Persons in Con			Philipper		STATE SHIPT OF IN				KIN THE THE SE		THE PERSON NAMED IN	The state of the s	AND THE STREET		CONTRACTOR			
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Matrix: GW-Groundwater SO-Soil DW-Drinking Water SE-Sediment SW-Surface Water WW-Wastewater A-Air O-Other (detail in comments)

Note: All samples submitted to ENCO Labs are in accordance with the terms and conditions listed on the reverse of this form, unless prior written agreements exist

# **Sample Preservation Verification**

## **ENCO Cary**



Work Order:

C505697

Project:

Swift Creek Water Quality

Client:

The Catena Group (TH015)

Project #: [none]

Logged In:

09-Jun-15 15:13 ,

Logged By: John C King

### C505697-01

Cont	Туре	Pres (pH) Requirement	pH Checked / In Control	pH Adjusted	Date/Time Adjusted	Reagent Used/Comments
В	250mLP+HNO3 [F]	<2	YINI	YINIQ		
С	250mLP+H2SO4	<2	OX / N / NA	Y / A / NA		
D	250mLP+HNO3	<2	KY N / NA	Y / (N) / NA		

### C505697-02

Cont	Туре	Pres (pH) Requirement	pH Checked / In Control	pH Adjusted	Date/Time Adjusted	Reagent Used/Comments
В	250mLP+HNO3 [F]	<2	ANNA	YININA		
С	250mLP+H2SO4	<2	Ø/N/NA	Y / Ø / NA		
D	250mLP+HNO3	<2 .,	A/N/NA	Y / (N) / NA		

#### C505697-03

Cont	Туре	Pres (pH) Requirement	pH Checked / In Control	pH Adjusted	Date/Time Adjusted	Reagent Used/Comments
В	250mLP+HNO3 [F]	<2	YININA	YINI		
С	250mLP+H2SO4	<2	Ø/N/NA	Y / 69 / NA		
D	250mLP+HNO3	<2	S/N/NA	Y / (N) / NA		

R	leagent Name	ID
1		
2		

Rea	agent Name	ID	
3			
4	Ve Land	O. L. T.	

	Reagent Name	ID
5		
6		

102-A Woodwinds Industrial Court Cary NC, 27511

Phone: 919.467.3090 FAX: 919.467.3515

Thursday, July 16, 2015 The Catena Group (TH015) Attn: Nancy Scott 410-B Millstone Drive Hillsborough, NC 27278

RE: Laboratory Results for

Project Number: [none], Project Name/Desc: Swift Creek Water Quality

ENCO Workorder(s): C508411

Dear Nancy Scott,

Enclosed is a copy of your laboratory report for test samples received by our laboratory on Wednesday, July 1, 2015.

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. Results for these procedures apply only to the samples as submitted.

The analytical results contained in this report are in compliance with NELAC standards, except as noted in the project narrative. This report shall not be reproduced except in full, without the written approval of the Laboratory.

This report contains only those analyses performed by Environmental Conservation Laboratories. Unless otherwise noted, all analyses were performed at ENCO Cary. Data from outside organizations will be reported under separate cover.

If you have any questions or require further information, please do not hesitate to contact me.

Sill Scatt

Sincerely,

Bill Scott

Project Manager

Enclosure(s)



#### SAMPLE SUMMARY/LABORATORY CHRONICLE

Client ID: NC 210		Lab ID:	C508411-01	Sampled:	07/01/15 0	)9:10	Received:	07/01/15 14:30	6
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	/Time(s)		Analysis Date/	Time(s)		
EPA 300.0	07/29/15		07/07/15	09:00		07/07/15 19:53			
EPA 310.2	07/15/15		07/02/15	12:24		07/02/15 14:10			
EPA 350.1	07/29/15		07/08/15	09:12		07/08/15 11:09			
EPA 6010C	12/28/15		07/02/15	08:40		07/06/15 14:02			
SM 5310B-2000	07/29/15		07/15/15	10:00		07/15/15 11:20			
Client ID: SR1555		Lab ID:	C508411-02	Sampled:	07/01/15 1	L1:20	Received:	07/01/15 14:30	6
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	/Time(s)		Analysis Date/	Time(s)		
EPA 300.0	07/29/15		07/07/15	09:00		07/07/15 20:10			
EPA 310.2	07/15/15		07/02/15	12:24		07/02/15 14:11			
EPA 350.1	07/29/15		07/08/15	09:12		07/08/15 11:11			
EPA 6010C	12/28/15		07/02/15	08:40		07/06/15 15:02			
SM 5310B-2000	07/29/15		07/15/15	10:00		07/15/15 11:20			
Client ID: NC 50		Lab ID:	C508411-03	Sampled:	07/01/15 1	13:15	Received:	07/01/15 14:30	6
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	/Time(s)		Analysis Date/	Time(s)		
EPA 300.0	07/29/15		07/07/15	09:00		07/07/15 21:01			
EPA 310.2	07/15/15		07/02/15	12:24		07/02/15 14:11			
EPA 350.1	07/29/15		07/08/15	09:12		07/08/15 11:14			
EPA 6010C	12/28/15		07/02/15	08:40		07/06/15 15:05			
SM 5310B-2000	07/29/15		07/15/15	10:00		07/15/15 11:20			
Client ID: NC 210 Dissolved		Lab ID:	C508411-04	Sampled:	07/01/15 0	)9:10	Received:	07/01/15 14:30	6
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	/Time(s)		Analysis Date/	Time(s)		
EPA 6010C	12/28/15		07/02/15	08:40		07/06/15 15:08			
Client ID: SR 1555 Dissolved		Lab ID:	C508411-05	Sampled:	07/01/15 1	L1:20	Received:	07/01/15 14:3	6
<u>Parameter</u>	Hold Date/Time(s)		<u>Prep Date</u>	/Time(s)		Analysis Date/	Time(s)		
EPA 6010C	12/28/15		07/02/15	08:40		07/06/15 15:10			
Client ID: NC 50 Dissolved		Lab ID:	C508411-06	Sampled:	07/01/15 1	L3:15	Received:	07/01/15 14:30	6
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	/Time(s)		Analysis Date/	Time(s)		



#### **SAMPLE DETECTION SUMMARY**

Client ID: NC 210			Lab ID:	C508411-01			
<u>Analyte</u>	<u>Results</u>	<u>Flag</u>	<u>MDL</u>	<u>PQL</u>	<u>Units</u>	<u>Method</u>	<u>Notes</u>
Calcium - Total	7000		39.0	100	ug/L	EPA 6010C	
Chloride	8.5		2.2	5.0	mg/L	EPA 300.0	
Magnesium - Total	2420	В	29.0	100	ug/L	EPA 6010C	QB-01
Potassium - Total	2650		150	500	ug/L	EPA 6010C	
Sodium - Total	7640		400	500	ug/L	EPA 6010C	
Sulfate as SO4	3.9	J	2.9	5.0	mg/L	EPA 300.0	
Total Alkalinity as CaCO3	23		14	15	mg/L	EPA 310.2	
Total Organic Carbon - Dissolved	5.7		0.34	1.0	mg/L	SM 5310B-2000	
Client ID: SR1555			Lab ID:	C508411-02			
<u>Analyte</u>	<u>Results</u>	<u>Flag</u>	<u>MDL</u>	<u>PQL</u>	<u>Units</u>	<u>Method</u>	<u>Notes</u>
Ammonia as N	0.073	J	0.045	0.10	mg/L	EPA 350.1	
Calcium - Total	6890		39.0	100	ug/L	EPA 6010C	
Chloride	8.5		2.2	5.0	mg/L	EPA 300.0	
Magnesium - Total	2350	В	29.0	100	ug/L	EPA 6010C	QB-01
Potassium - Total	2550		150	500	ug/L	EPA 6010C	
Sodium - Total	7550		400	500	ug/L	EPA 6010C	
Sulfate as SO4	3.8	J	2.9	5.0	mg/L	EPA 300.0	
Total Alkalinity as CaCO3	29		14	15	mg/L	EPA 310.2	
Total Organic Carbon - Dissolved	5.3		0.34	1.0	mg/L	SM 5310B-2000	
Client ID: NC 50			Lab ID:	C508411-03			
<u>Analyte</u>	<u>Results</u>	<u>Flag</u>	<u>MDL</u>	<u>PQL</u>	<u>Units</u>	<u>Method</u>	Notes
Calcium - Total	7470		39.0	100	ug/L	EPA 6010C	
Chloride	9.7		2.2	5.0	mg/L	EPA 300.0	
Magnesium - Total	2400	В	29.0	100	ug/L	EPA 6010C	QB-01
Potassium - Total	2720		150	500	ug/L	EPA 6010C	
Sodium - Total	7800		400	500	ug/L	EPA 6010C	
Sulfate as SO4	4.1	J	2.9	5.0	mg/L	EPA 300.0	
Fotal Alkalinity as CaCO3	27		14	15	mg/L	EPA 310.2	
Total Organic Carbon - Dissolved	5.9		0.34	1.0	mg/L	SM 5310B-2000	
Zinc - Total	4.09	J	3.80	10.0	ug/L	EPA 6010C	



#### **ANALYTICAL RESULTS**

**Description:** NC 210 **Lab Sample ID:** C508411-01 **Received:** 07/01/15 14:36

**Matrix:** Water **Sampled:** 07/01/15 09:10

Project: Swift Creek Water Quality Sampled By: Nancy Scott

#### Metals (total recoverable) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	<u>Flag</u>	<u>Units</u>	<u>DF</u>	<u>MDL</u>	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Cadmium [7440-43-9]^	ND		ug/L	1	0.360	1.00	5G02007	EPA 6010C	07/06/15 14:02	JDH	
Calcium [7440-70-2]^	7000		ug/L	1	39.0	100	5G02007	EPA 6010C	07/06/15 14:02	JDH	
Copper [7440-50-8]^	ND		ug/L	1	1.60	10.0	5G02007	EPA 6010C	07/06/15 14:02	JDH	
Lead [7439-92-1]^	ND		ug/L	1	3.10	10.0	5G02007	EPA 6010C	07/06/15 14:02	JDH	
Magnesium [7439-95-4]^	2420	В	ug/L	1	29.0	100	5G02007	EPA 6010C	07/06/15 14:02	JDH	QB-01
Nickel [7440-02-0]^	ND		ug/L	1	1.80	10.0	5G02007	EPA 6010C	07/06/15 14:02	JDH	
Potassium [7440-09-7]^	2650		ug/L	1	150	500	5G02007	EPA 6010C	07/06/15 14:02	JDH	
Sodium [7440-23-5]^	7640		ug/L	1	400	500	5G02007	EPA 6010C	07/06/15 14:02	JDH	
Zinc [7440-66-6]^	ND		ug/L	1	3.80	10.0	5G02007	EPA 6010C	07/06/15 14:02	JDH	

#### **Classical Chemistry Parameters**

^ - ENCO Cary certified analyte [NC 591]

, ,											
Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<b>Analyzed</b>	By	<u>Notes</u>
Ammonia as N [7664-41-7]^	ND		mg/L	1	0.045	0.10	5G08004	EPA 350.1	07/08/15 11:09	SHA	
Chloride [16887-00-6]^	8.5		mg/L	1	2.2	5.0	5G07010	EPA 300.0	07/07/15 19:53	SHA	
Sulfate as SO4 [14808-79-8]^	3.9	J	mg/L	1	2.9	5.0	5G07010	EPA 300.0	07/07/15 19:53	SHA	
Total Alkalinity as CaCO3 [471-34-1]^	23		mg/L	1	14	15	5G02027	EPA 310.2	07/02/15 14:10	SHA	

#### Classical Chemistry Parameters (Dissolved)

^ - ENCO Orlando certified analyte [NC 424]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	<u>MDL</u>	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Total Organic Carbon^	5.7		ma/l	1	0.34	1.0	5G15018	SM 5310B-2000	07/15/15 11:20	RSΔ	



#### **ANALYTICAL RESULTS**

**Description:** SR1555 **Lab Sample ID:** C508411-02 **Received:** 07/01/15 14:36

**Matrix:** Water **Sampled:** 07/01/15 11:20

**Project:** Swift Creek Water Quality Sampled By: Nancy Scott

#### Metals (total recoverable) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	DF	<u>MDL</u>	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Cadmium [7440-43-9]^	ND		ug/L	1	0.360	1.00	5G02007	EPA 6010C	07/06/15 15:02	JDH	
Calcium [7440-70-2]^	6890		ug/L	1	39.0	100	5G02007	EPA 6010C	07/06/15 15:02	JDH	
Copper [7440-50-8]^	ND		ug/L	1	1.60	10.0	5G02007	EPA 6010C	07/06/15 15:02	JDH	
Lead [7439-92-1]^	ND		ug/L	1	3.10	10.0	5G02007	EPA 6010C	07/06/15 15:02	JDH	
Magnesium [7439-95-4]^	2350	В	ug/L	1	29.0	100	5G02007	EPA 6010C	07/06/15 15:02	JDH	QB-01
Nickel [7440-02-0]^	ND		ug/L	1	1.80	10.0	5G02007	EPA 6010C	07/06/15 15:02	JDH	
Potassium [7440-09-7]^	2550		ug/L	1	150	500	5G02007	EPA 6010C	07/06/15 15:02	JDH	
Sodium [7440-23-5]^	7550		ug/L	1	400	500	5G02007	EPA 6010C	07/06/15 15:02	JDH	
Zinc [7440-66-6]^	ND		ug/L	1	3.80	10.0	5G02007	EPA 6010C	07/06/15 15:02	JDH	

#### **Classical Chemistry Parameters**

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Ammonia as N [7664-41-7]^	0.073	J	mg/L	1	0.045	0.10	5G08004	EPA 350.1	07/08/15 11:11	SHA	
Chloride [16887-00-6]^	8.5		mg/L	1	2.2	5.0	5G07010	EPA 300.0	07/07/15 20:10	SHA	
Sulfate as SO4 [14808-79-8]^	3.8	J	mg/L	1	2.9	5.0	5G07010	EPA 300.0	07/07/15 20:10	SHA	
Total Alkalinity as CaCO3 [471-34-1]^	29		mg/L	1	14	15	5G02027	EPA 310.2	07/02/15 14:11	SHA	

#### Classical Chemistry Parameters (Dissolved)

^ - ENCO Orlando certified analyte [NC 424]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	<u>MDL</u>	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Total Organic Carbon^	5.3		ma/l	1	0.34	1.0	5G15018	SM 5310B-2000	07/15/15 11:20	RSΔ	



#### **ANALYTICAL RESULTS**

**Description:** NC 50 **Lab Sample ID:** C508411-03 **Received:** 07/01/15 14:36

 Matrix:
 Water
 Sampled: 07/01/15 13:15
 Work Order: C508411

**Project:** Swift Creek Water Quality Sampled By: Nancy Scott

#### Metals (total recoverable) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Cadmium [7440-43-9]^	ND		ug/L	1	0.360	1.00	5G02007	EPA 6010C	07/06/15 15:05	JDH	
Calcium [7440-70-2]^	7470		ug/L	1	39.0	100	5G02007	EPA 6010C	07/06/15 15:05	JDH	
Copper [7440-50-8]^	ND		ug/L	1	1.60	10.0	5G02007	EPA 6010C	07/06/15 15:05	JDH	
Lead [7439-92-1]^	ND		ug/L	1	3.10	10.0	5G02007	EPA 6010C	07/06/15 15:05	JDH	
Magnesium [7439-95-4]^	2400	В	ug/L	1	29.0	100	5G02007	EPA 6010C	07/06/15 15:05	JDH	QB-01
Nickel [7440-02-0]^	ND		ug/L	1	1.80	10.0	5G02007	EPA 6010C	07/06/15 15:05	JDH	
Potassium [7440-09-7]^	2720		ug/L	1	150	500	5G02007	EPA 6010C	07/06/15 15:05	JDH	
Sodium [7440-23-5]^	7800		ug/L	1	400	500	5G02007	EPA 6010C	07/06/15 15:05	JDH	
Zinc [7440-66-6]^	4.09	J	ug/L	1	3.80	10.0	5G02007	EPA 6010C	07/06/15 15:05	JDH	

#### **Classical Chemistry Parameters**

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	<u>MDL</u>	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Ammonia as N [7664-41-7]^	ND		mg/L	1	0.045	0.10	5G08004	EPA 350.1	07/08/15 11:14	SHA	
Chloride [16887-00-6]^	9.7		mg/L	1	2.2	5.0	5G07010	EPA 300.0	07/07/15 21:01	SHA	
Sulfate as SO4 [14808-79-8]^	4.1	J	mg/L	1	2.9	5.0	5G07010	EPA 300.0	07/07/15 21:01	SHA	
Total Alkalinity as CaCO3 [471-34-1]^	27		mg/L	1	14	15	5G02027	EPA 310.2	07/02/15 14:11	SHA	

#### Classical Chemistry Parameters (Dissolved)

^ - ENCO Orlando certified analyte [NC 424]

Analyte [CAS Number] Results <u>Flag</u> **Units** DF <u>MDL</u> <u>PQL</u> **Batch Method Analyzed** <u>By</u> **Notes** Total Organic Carbon^ 5.9 mg/L 0.34 1.0 5G15018 SM 5310B-2000 07/15/15 11:20 RSA

**Description:** NC 210 Dissolved **Lab Sample ID:** C508411-04 **Received:** 07/01/15 14:36

**Matrix:** Water **Sampled:** 07/01/15 09:10

Project: Swift Creek Water Quality Sampled By: Nancy Scott

#### Metals (Dissolved) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number] Results **Units** DF MDL <u>PQL</u> **Batch Method Analyzed Notes** <u>Flaq</u> By Copper [7440-50-8]^ ND ug/L 1.60 10.0 5G02007 EPA 6010C 07/06/15 15:08 JDH

**Description:** SR 1555 Dissolved **Lab Sample ID:** C508411-05 **Received:** 07/01/15 14:36

**Matrix:** Water **Sampled:** 07/01/15 11:20

Project: Swift Creek Water Quality Sampled By: Nancy Scott

#### Metals (Dissolved) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number] MDL Results **Units** DF **PQL** Method **Analyzed** Flag **Batch** By **Notes** 07/06/15 15:10 Copper [7440-50-8]^ ND ug/L 1.60 10.0 5G02007 EPA 6010C JDH

**Description:** NC 50 Dissolved **Lab Sample ID:** C508411-06 **Received:** 07/01/15 14:36

Matrix: Water Sampled: 07/01/15 13:15

**Project:** Swift Creek Water Quality Sampled By: Nancy Scott

#### Metals (Dissolved) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Copper [7440-50-8]^	ND		ug/L	1	1.60	10.0	5G02007	EPA 6010C	07/06/15 15:13	JDH	

Work Order: C508411

Work Order: C508411

Work Order: C508411



#### Metals (total recoverable) by EPA 6000/7000 Series Methods - Quality Control

#### Batch 5G02007 - EPA 3005A

LCS (5G02007-BS1)

Blank (5G02007-BLK1) Prepared: 07/02/2015 08:41 Analyzed: 07/06/2015 13:45

Analyte	Result	Flag	POL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Cadmium	0.360	U	1.00	ug/L							
Calcium	39.0	U	100	ug/L							
Copper	1.60	U	10.0	ug/L							
Lead	3.10	U	10.0	ug/L							
Magnesium	38.9	J	100	ug/L							
Nickel	1.80	U	10.0	ug/L							
Potassium	150	U	500	ug/L							
Sodium	400	U	500	ug/L							
Zinc	3.80	U	10.0	ug/L							

Prepared: 07/02/2015 08:41 Analyzed: 07/06/2015 13:58

<u>Analyte</u>	Result	<u>Flaq</u>	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Cadmium	21.2		1.00	ug/L	20.0		106	80-120			
Calcium	2270		100	ug/L	2000		113	80-120			
Copper	215		10.0	ug/L	200		108	80-120			
Lead	212		10.0	ug/L	200		106	80-120			
Magnesium	2120	В	100	ug/L	2000		106	80-120			
Nickel	213		10.0	ug/L	200		106	80-120			
Potassium	11100		500	ug/L	10000		111	80-120			
Sodium	10100		500	ug/L	10000		101	80-120			
Zinc	212		10.0	ug/L	200		106	80-120			

Matrix Spike (5G02007-MS1) Prepared: 07/02/2015 08:41 Analyzed: 07/06/2015 14:04

Source: C508411-01											
Analyte	Result	Flag	POL	Units	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Cadmium	20.4		1.00	ug/L	20.0	0.360 U	102	75-125			
Calcium	9000		100	ug/L	2000	7000	100	75-125			
Copper	210		10.0	ug/L	200	1.60 U	105	75-125			
Lead	204		10.0	ug/L	200	3.10 U	102	75-125			
Magnesium	4490	В	100	ug/L	2000	2420	103	75-125			
Nickel	205		10.0	ug/L	200	1.80 U	103	75-125			
Potassium	13300		500	ug/L	10000	2650	107	75-125			
Sodium	18100		500	ug/L	10000	7640	105	75-125			
Zinc	206		10.0	ug/L	200	3.80 U	103	75-125			

 Matrix Spike Dup (5G02007-MSD1)
 Prepared: 07/02/2015 08:41 Analyzed: 07/06/2015 14:07

10.0

205

Analyte	Result	<u>Flaq</u>	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>
Cadmium	20.5		1.00	ug/L	20.0	0.360 U	102	75-125	0.3	20
Calcium	8840		100	ug/L	2000	7000	92	75-125	2	20
Copper	210		10.0	ug/L	200	1.60 U	105	75-125	0.2	20
Lead	206		10.0	ug/L	200	3.10 U	103	75-125	1	20
Magnesium	4430	В	100	ug/L	2000	2420	100	75-125	1	20
Nickel	205		10.0	ug/L	200	1.80 U	102	75-125	0.1	20
Potassium	13000		500	ug/L	10000	2650	103	75-125	2	20
Sodium	18100		500	ug/L	10000	7640	104	75-125	0.3	20

Zinc

Source: C508411-01

200

3.80 U

102

75-125

ug/L

20

0.4

**Notes** 



|--|

Ratch	SGN2NN7 -	FDA ZNNSA	- Continued

Post Spike (5G02007-PS1) Prepared: 07/02/2015 08:41 Analyzed: 07/06/2015 14:10 Source: C508411-01 Spike %REC RPD Source Analyte **PQL** Flag **Units** Result Level Result %REC <u>Limits</u> RPD <u>Limit</u> Notes Cadmium 0.0193 0.00100 mg/L 0.0200 -6.72E-5 97 80-120 Calcium 0.100 2.00 7.00 90 80-120 8.80 mg/L 0.0100 0.200 0.000951 99 80-120 Copper 0.199 mg/L 0.0100 0.200 0.00116 80-120 0.196 mg/L 98 Lead Magnesium 4.29 0.100 mg/L 2.00 2.42 94 80-120 0.195 0.0100 mg/L 0.200 -0.000109 97 80-120 Nickel Potassium 12.7 0.500 mg/L 10.0 2.65 100 80-120 Sodium 17.3 0.500 10.0 97 80-120 mg/L 7.64 Zinc 0.195 0.0100 mg/L 0.200 0.00142 97 80-120

Metals (Dissolved) by EPA 6000/7000 Series Methods - Quality Control

#### Batch 5G02007 - EPA 3005A

**Blank (5G02007-BLK2)** Prepared: 07/02/2015 08:41 Analyzed: 07/06/2015 13:49

<u>Analyte</u>	Result	Flag	POL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Copper	1.60	U	10.0	ug/L							

**LCS (5G02007-BS1)** Prepared: 07/02/2015 08:41 Analyzed: 07/06/2015 13:58

<u>Analyte</u>	Result	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Copper	215		10.0	ug/L	200		108	80-120			

 Matrix Spike (5G02007-MS1)
 Prepared: 07/02/2015 08:41 Analyzed: 07/06/2015 14:04

Source: C508411-01

<u>Analyte</u>	Result	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Copper	210		10.0	ug/L	200	1.60 U	105	75-125			

 Matrix Spike Dup (5G02007-MSD1)
 Prepared: 07/02/2015 08:41 Analyzed: 07/06/2015 14:07

Source: C508411-01

Analyte	Result	Flag	POL	<u>Units</u>	Spike	Source	0/ BEC	%REC	D.D.D.	RPD	N-4
Alldiyte	Result	riay	PUL	UIIILS	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	<u>Notes</u>
Copper	210		10.0	ug/L	200	1.60 U	105	75-125	0.2	20	

**Post Spike (5G02007-PS1)** Prepared: 07/02/2015 08:41 Analyzed: 07/06/2015 14:10

Source: C508411-01

<u>Analyte</u>	Result	Flag	PQL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Copper	0.199		0.0100	mg/L	0.200	0.000951	99	80-120			

### Classical Chemistry Parameters - Quality Control

#### Batch 5G02027 - NO PREP

Blank (5G02027-BLK1) Prepared: 07/02/2015 12:24 Analyzed: 07/02/2015 13:57

Analyte	Result	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Total Alkalinity as CaCO3	14	U	15	mg/L							



Classical Chemistry Parameters	- Quality Con	trol									
Batch 5G02027 - NO PREP -	Continued										
LCS (5G02027-BS1)					Prepar	ed: 07/02/201	5 12:24 Anal	yzed: 07/02/	2015 13:57		
					Spike	Source		%REC		RPD	
<u>Analyte</u>	Result	Flag	<u>PQL</u>	<u>Units</u>	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Note:
Total Alkalinity as CaCO3	98		15	mg/L	100		98	80-120			
Matrix Spike (5G02027-MS1)					Prepar	ed: 07/02/201	5 12:24 Anal	yzed: 07/02/	2015 13:58		
Source: C504934-01					C!l			0/ BEC		nnn.	
<u>Analyte</u>	Result	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Note:
Total Alkalinity as CaCO3	14	U	15	mg/L	37.8	14 U		80-120			QM-0
Matrix Spike Dup (5G02027-M	SD1)				Prepar	ed: 07/02/201	5 12:24 Anal	yzed: 07/02/	2015 14:00		
Source: C504934-01											
Analyte	Result	Flag	POL	Units	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Total Alkalinity as CaCO3	14	U	15	mg/L	37.8	14 U		80-120		25	QM-0
Batch 5G07010 - NO PREP				<i>3,</i>							
Blank (5G07010-BLK1)					Prepar	ed: 07/07/201	5 09:00 Anal	yzed: 07/07/	2015 10:32		
<u>Analyte</u>	Result	Flag	POL	<u>Units</u>	Spike Level	Source Result	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Note:
Chloride	2.2	U	5.0	mg/L							
Sulfate as SO4	2.9	U	5.0	mg/L							
LCS (5G07010-BS1)					Prepar	ed: 07/07/201	5 09:00 Anal	yzed: 07/07/	2015 10:49		
					Spike	Source		%REC		RPD	
<u>Analyte</u>	Result	Flag	<u>PQL</u>	<u>Units</u>	Level	Result	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Notes
Chloride	54		5.0	mg/L	50.0		109	90-110			
Sulfate as SO4	52		5.0	mg/L	50.0		104	90-110			
Matrix Spike (5G07010-MS1)					Prepar	ed: 07/07/201	5 09:00 Anal	yzed: 07/07/	2015 11:06		
Source: C502337-01						_					
Analyte	Result	Flag	PQL	Units	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD Limit	Notes
Chloride	25		5.0	mg/L	20.0	5.5	97	90-110			
Sulfate as SO4	33		5.0	mg/L	20.0	14	99	90-110			
Matrix Spike (5G07010-MS3)					Prepar	ed: 07/07/201	5 09:00 Anal	yzed: 07/07/	2015 12:31		
Source: C502337-02RE1											
<u>Analyte</u>	Result	Flag	PQL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Chloride	180		20	mg/L	80.0	92	113	90-110			QM-0
Sulfate as SO4	220		20	mg/L	80.0	130	112	90-110			QM-0
Matrix Spike Dup (5G07010-M	SD1)				Prepar	ed: 07/07/201	5 09:00 Anal	yzed: 07/07/	2015 11:23		
Source: C502337-01											
<u>Analyte</u>	Result	Flag	POL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Chloride			5.0	mg/L	20.0	5.5	101	90-110	3	10	-1000
CHIOHUE	26		3.0	IIIU/L	20.0	٥.5	101				
Sulfate as SO4	26 34		5.0	mg/L	20.0	14	103	90-110	2	10	



	- Continued										
Blank (5G08004-BLK1)					Prepare	ed: 07/08/201	5 09:12 Anal	yzed: 07/08/	2015 10:18		
					Spike	Source		%REC		RPD	
<u>Analyte</u>	Result	<u>Flaq</u>	POL	<u>Units</u>	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Not
Ammonia as N	0.045	U	0.10	mg/L							
LCS (5G08004-BS1)					Prepare	ed: 07/08/201	5 09:12 Anal	yzed: 07/08/	2015 10:20		
<u>Analyte</u>	<u>Result</u>	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Not
Ammonia as N	1.0		0.10	mg/L	0.997		104	90-110			
Matrix Spike (5G08004-MS1)	)				Prepare	ed: 07/08/201	5 09:12 Anal	yzed: 07/08/	2015 10:22		
Source: C505857-01											
Analyte	Result	Flag	PQL	Units	Spike Level	Source	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Not
Ammonia as N	54		5.0	mg/L	19.9	<u>Result</u> 35	91	90-110	KI D	Lillie	1100
Matrix Spike (5G08004-MS2)	)			3.	Prepare	ed: 07/08/201	5 09:12 Anal	yzed: 07/08/	2015 10:30		
Source: C505857-02											
Amaluka	Dagult		DOL	lluit.	Spike	Source	0/ 550	%REC		RPD	
Analyte Ammonia as N	<u>Result</u> 11	<u>Flaq</u>	<u>POL</u> 1.0	<u>Units</u> mg/L	<b>Level</b> 3.98	Result 7.1	<b>%REC</b> 90	<u>Limits</u> 90-110	RPD	<u>Limit</u>	Not
Matrix Spike Dup (5G08004-I			1.0	mg/ L		ed: 07/08/201			2015 10:26		
Source: C505857-01	. 1022)				Перин	ca. 07/00/201	3 03.12 7 mai	y 200. 077007.	2013 10.20		
30uice. C303037-01					Spike	Source		%REC		RPD	
<u>Analyte</u>	<u>Result</u>	Flag	PQL	<u>Units</u>	Level	Result	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Not
Ammonia as N	53		5.0	mg/L	19.9	35	87	90-110	2	10	QM-
Ammonia as N Classical Chemistry Parameters		Quality		mg/L	19.9	35	87	90-110	2	10	QM-
	s (Dissolved) -	Quality		mg/L	19.9	35	87	90-110	2	10	QM-
Classical Chemistry Parameters	s (Dissolved) -	Quality		mg/L		35 ed: 07/15/201				10	QM-
Classical Chemistry Parameters  Batch 5G15018 - NO PREP	s (Dissolved) -	Quality		mg/L						10	QM-
Classical Chemistry Parameters  Batch 5G15018 - NO PREP  Blank (5G15018-BLK1)  Analyte	s (Dissolved) -	Flag	Control POL	<u>Units</u>	Prepare	ed: 07/15/201		yzed: 07/15/			
Classical Chemistry Parameters  Batch 5G15018 - NO PREP  Blank (5G15018-BLK1)  Analyte  Total Organic Carbon	s (Dissolved) -		Control		Prepare Spike Level	ed: 07/15/201 Source <u>Result</u>	5 10:00 Anal	yzed: 07/15/ %REC <u>Limits</u>	2015 11:20 <b>RPD</b>	RPD	
Classical Chemistry Parameters  Batch 5G15018 - NO PREP	s (Dissolved) -	Flag	Control POL	<u>Units</u>	Prepare Spike Level	ed: 07/15/201: <b>Source</b>	5 10:00 Anal	yzed: 07/15/ %REC <u>Limits</u>	2015 11:20 <b>RPD</b>	RPD	
Classical Chemistry Parameters  Batch 5G15018 - NO PREP  Blank (5G15018-BLK1)  Analyte  Total Organic Carbon	s (Dissolved) -	Flag	Control POL	<u>Units</u>	Prepare Spike Level Prepare	ed: 07/15/201 <b>Source</b> <u>Result</u> ed: 07/15/201	5 10:00 Anal	wzed: 07/15/ %REC <u>Limits</u> yzed: 07/15/	2015 11:20 <b>RPD</b>	RPD <u>Limit</u>	
Classical Chemistry Parameters  Batch 5G15018 - NO PREP  Blank (5G15018-BLK1)  Analyte  Total Organic Carbon  LCS (5G15018-BS1)	s (Dissolved) -	Flag	Control POL	<u>Units</u>	Prepare Spike Level	ed: 07/15/201 Source <u>Result</u>	5 10:00 Anal	yzed: 07/15/ %REC <u>Limits</u>	2015 11:20 <b>RPD</b>	RPD	Not
Classical Chemistry Parameters  Batch 5G15018 - NO PREP  Blank (5G15018-BLK1)  Analyte  Total Organic Carbon	Result 0.34	<b>Flag</b> U	POL 1.0	<u>Units</u> mg/L	Prepare Spike Level Prepare	ed: 07/15/201:  Source Result  ed: 07/15/201:  Source	5 10:00 Anal %REC 5 10:00 Anal	wzed: 07/15//	2015 11:20 <b>RPD</b> 2015 11:20	RPD <u>Limit</u>	QM-
Classical Chemistry Parameters  Batch 5G15018 - NO PREP  Blank (5G15018-BLK1)  Analyte  Fotal Organic Carbon  LCS (5G15018-BS1)  Analyte	Result 0.34	<b>Flag</b> U	POL POL	Units mg/L Units	Prepare  Spike Level  Prepare  Spike Level 40.0	ed: 07/15/201:  Source Result  ed: 07/15/201:  Source	5 10:00 Anal  **REC 5 10:00 Anal  **REC 98	wrec 17/15/2  wrec 17/15/2  wrec 17/15/2  wrec 17/15/2  wrec 17/15/2  wrec 18/15/2  85-115	2015 11:20  RPD  2015 11:20  RPD	RPD <u>Limit</u>	Not
Classical Chemistry Parameters  Batch 5G15018 - NO PREP  Blank (5G15018-BLK1)  Analyte  Total Organic Carbon  LCS (5G15018-BS1)  Analyte  Total Organic Carbon  LCS Dup (5G15018-BSD1)	Result 0.34  Result 39	Flag U Flag	POL 1.0 POL 1.0	Units mg/L Units mg/L	Prepare  Spike Level  Prepare  Spike Level  40.0  Prepare	Source Result  Source Result  Source Result  Source Result  Source Result  Source Result	%REC 98 5 10:00 Anal	%REC Limits  %REC Limits  yzed: 07/15/.  %REC Limits  85-115  yzed: 07/15/.  %REC	2015 11:20  RPD  2015 11:20  RPD  2015 11:20	RPD Limit RPD Limit	Not
Classical Chemistry Parameters  Batch 5G15018 - NO PREP  Blank (5G15018-BLK1)  Analyte  Fotal Organic Carbon  LCS (5G15018-BS1)  Analyte  Fotal Organic Carbon  LCS Dup (5G15018-BSD1)	Result 39  Result	<b>Flag</b> U	POL 1.0 POL	Units mg/L Units mg/L Units	Prepare  Spike Level  Prepare  Spike Level  40.0  Prepare  Spike Level	ed: 07/15/201:  Source Result  ed: 07/15/201:  Source Result  ed: 07/15/201:	%REC 5 10:00 Anal %REC 98 5 10:00 Anal	%REC Limits 85-115 yzed: 07/15/. %REC Limits 85-115 yzed: 07/15/. %REC Limits	2015 11:20  RPD  2015 11:20  RPD  2015 11:20	RPD Limit RPD Limit	Not
Classical Chemistry Parameters  Batch 5G15018 - NO PREP  Blank (5G15018-BLK1)  Analyte  Total Organic Carbon  LCS (5G15018-BS1)  Analyte  Total Organic Carbon  LCS Dup (5G15018-BSD1)	Result 39  Result 44	Flag U Flag	POL 1.0 POL 1.0	Units mg/L Units mg/L	Prepare  Spike Level  Prepare  Spike Level  40.0  Prepare  Spike Level 40.0	Source Result  Source Result  Source Result  Source Result  Source Result  Source Result	%REC 98 5 10:00 Anal %REC 98 5 10:00 Anal %REC 111	%REC Limits 85-115 %REC REC REC REC REC REC REC REC REC REC	2015 11:20  RPD  2015 11:20  RPD  2015 11:20  RPD  12	RPD Limit RPD Limit	Not
Classical Chemistry Parameters  Batch 5G15018 - NO PREP  Blank (5G15018-BLK1)  Analyte  Fotal Organic Carbon  LCS (5G15018-BS1)  Analyte  Fotal Organic Carbon  LCS Dup (5G15018-BSD1)  Analyte  Fotal Organic Carbon	Result 39  Result 44	Flag U Flag	POL 1.0 POL	Units mg/L Units mg/L Units	Prepare  Spike Level  Prepare  Spike Level  40.0  Prepare  Spike Level 40.0	Source Result  Source Result  Source Result  Source Result  Source Result	%REC 98 5 10:00 Anal %REC 98 5 10:00 Anal %REC 111	%REC Limits 85-115 %REC REC REC REC REC REC REC REC REC REC	2015 11:20  RPD  2015 11:20  RPD  2015 11:20  RPD  12	RPD Limit RPD Limit	Not
Blank (5G15018 - NO PREP  Blank (5G15018-BLK1)  Analyte  Fotal Organic Carbon  LCS (5G15018-BS1)  Analyte  Fotal Organic Carbon  LCS Dup (5G15018-BSD1)  Analyte  Fotal Organic Carbon  Matrix Spike (5G15018-MS1)	Result 39  Result 44	Flag U Flag	POL 1.0 POL	Units mg/L Units mg/L Units	Prepare  Spike Level  Prepare  Spike Level  40.0  Prepare  Spike Level 40.0	Source Result  Source Result  Source Result  Source Result  Source Result	%REC 98 5 10:00 Anal %REC 98 5 10:00 Anal %REC 111	%REC Limits 85-115 %REC REC REC REC REC REC REC REC REC REC	2015 11:20  RPD  2015 11:20  RPD  2015 11:20  RPD  12	RPD Limit RPD Limit	Not



#### Classical Chemistry Parameters (Dissolved) - Quality Control

#### Batch 5G15018 - NO PREP - Continued

Matrix Spike Dup (5G15018-MSD1) Prepared: 07/15/2015 10:00 Analyzed: 07/15/2015 11:20

Source: A504277-01

Analyte	Result	Flag	PQL	<u>Units</u>	Spike Level	Source	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Organic Carbon	44	1144	1.0		40.0	Result		05 115	KFD 5	21	Hotes
rotal Organic Carbon	77		1.0	mg/L	TU.U	э.т	57	92-112	5	21	



#### **FLAGS/NOTES AND DEFINITIONS**

- **B** The analyte was detected in the associated method blank.
- **D** The sample was analyzed at dilution.
- The reported value is between the laboratory method detection limit (MDL) and the laboratory method reporting limit (MRL), adjusted for actual sample preparation data and moisture content, where applicable.
- **U** The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
- **E** The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate.
- MRL Method Reporting Limit. The MRL is roughly equivalent to the practical quantitation limit (PQL) and is based on the low point of the calibration curve, when applicable, sample preparation factor, dilution factor, and, in the case of soil samples, moisture content.
- **ND** The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
- **N** The analysis indicates the presence of an analyte for which there is presumptive evidence (85% or greater confidence) to make a "tentative identification".
- **P** Greater than 25% concentration difference was observed between the primary and secondary GC column. The lower concentration is reported.
- **QB-01** The method blank had a positive result for the analyte; however, the concentration in the method blank is less than 10% of the sample result, which minimizes the impact of the deviation.
- **QM-05** The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.

AA AA AA CHILCHUD STOIL

	THE WAY OF THE PARTY OF	Comments/Special Reporting Requirements	Sample Kit Prepared By	The second secon	CARGO SECTION OF THE PROPERTY OF THE PARTY O					Player ME S. O.S. AND SERVICE STREET	NC SO	SP 1555	NC 210	Item # Sample ID (Field Identification)	CONTRACTOR CONTRACTOR CONTRACTOR	Samplific Gradules	Narray och	Sampler(s) Name, Affiliation (Print)	919 732 1300	Hilsborough	1000 Corporate Dr. Swite 10	Address The Catena Group	Client Name	
		CONTRACTOR	Date/Time		Mintel 2 other					AND INTERIOR	+		7/11/15	Collection Date	Samuel Property.		old framiles	NAME OF TAXABLE PARTY.		27278	ite 101	P	A 100	Orlando, FL 32824 (407) 826-5314 F
Cooler #'s & Temps on Receipt	Relinquished By	Relinquished By	Relinquished B		AND THE RESERVE					The state of the s	- 15	11:20	9:10	Collection Comp / Grab	A STANDARD TO BE	oile Location / Time Zone		Billing Contact	Na Vontact		Swift Greek	Project Name/Desc	Project Number	Orlando, FL 32824 (407) 826-5314 Fax (407) 850-6945
n Receipt		STATE OF STA	1						1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		+		SW	Matrix irab (see codes)					101	STATE STATE	ic Wester	ALCOHOLD STATE	March Special Por	Jacksonville, FL 32216-6069 (904) 296-3007 Fax (904) 296-6210
7											+		6	Total # of Containers			1000				Qualia	100	THE PERSON	2216-6069 Fax (904) 296-621
	Date	Date	Date	< Total # of Containers						30	×	×	×		Paralle San	150	100	100		Ch 350	30	de	THE RESERVE	0
	Date/Time	Date/Time	P 336P	of Containe	Section in		THE REAL PROPERTY.	27.46			1		×	10-00	Preser						ug,	Naj		
	P.		1 2 3		100				au au		1		×		Preservation (See Codes)	Qu	1	F				2000	Req	Cary, NC 27511 (919) 467-3090
	Received By	Received By	Received By	1	-			大変		U I	4	The state of the s	×		Codes) (Combine as necessary	Su 100	14	M3	tu:	301 B F	) Sissa	olve	luested Applyses	Cary, NC 27511 (919) 467-3090 Fax (919) 467-3515
Candition Upon Receipt		AND SECTION OF THE PERSON OF T		Contact Motor Contact	は、世界のでは、一般の			and place the description of the second seco		*					necessary)	Description (Section 1975)				Total Management		TO SEE THE SUST OF SEE	CASSA STATE OF STATE	515
pon Receipt	Date/Time	Sate/Time	Paterline 1436	The state of the s	STATE OF THE STATE	The state of the s	The second second	THE RESERVE ASSESSMENT OF THE PERSON OF THE	THE STATE OF					Sample Comments	11118000	Lab Wolkolder		Dire / /	Expedited	Standard	acceptance by the facility Page		naroun	Page of

Matrix: GW-Groundwater SO-Soil DW-Drinking Water SE-Sediment SW-Surface Water WW-Wastewater A-Air O-Other (detail in comments)

Preservation: I-loe H-HCI N-HNO3 S-H2SO4 NO-NaOH O-Other (detail in comments).

# **Sample Preservation Verification**

## **ENCO Cary**



Work Order:

C508411

The Catena Group (TH015)

Project:

Swift Creek Water Quality

Client: Logged In:

01-Jul-15 15:06 ,

Project #: Logged By:

John C King

[none]

### C508411-01

Cont	Туре	Pres (pH) Requirement	pH Checked / In Control	pH Adjusted	Date/Time Adjusted	Reagent Used/Comments
С	250mLP+H2SO4	<2	(V) N / NA	Y / 10 / NA		1,471,421, 19
D	250mLP+HNO3	<2	0/N/NA	Y / 🕅 / NA		

#### C508411-02

Cont	Туре	Pres (pH) Requirement	pH Checked / In Control	pH Adjusted	Date/Time Adjusted	Reagent Used/Comments
С	250mLP+H2SO4	<2	Ø/N/NA	Y / Ø / NA		
D	250mLP+HNO3	<2	M/N/NA	Y /ON / NA		

#### C508411-03

Cont	Туре	Pres (pH) Requirement	Date/Time Adjusted	Reagent Used/Comments		
С	250mLP+H2SO4	<2	Ø/N/NA	Y/N/NA	- 14 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
D	250mLP+HNO3	<2	Ø / N / NA	Y / 10 / NA		

### C508411-04

Cont	Туре	Pres (pH) Requirement	pH Checked / In Control	pH Adjusted	Date/Time Adjusted	Reagent Used/Comments
А	250mLP+HNO3 [F]	<2	YININA	YININA		

#### C508411-05

Cont	Туре	Pres (pH) Requirement	pH Checked / In Control	pH Adjusted	Date/Time Adjusted	Reagent Used/Comments
Α	250mLP+HNO3 [F]	<2	YININA	Y/N/NA		

#### C508411-06

Cont	Туре	Pres (pH) Requirement	pH Checked / In Control	pH Adjusted	Date/Time Adjusted	Reagent Used/Comments
Α	250mLP+HNO3 [F]	<2	YININA	YININA	*	

Reagent Name ID
1
2

Reagent Na	me ID
3	
4	

Reagent Name	ID
Page 14	of 1.4

102-A Woodwinds Industrial Court Cary NC, 27511

Phone: 919.467.3090 FAX: 919.467.3515

Thursday, July 23, 2015 The Catena Group (TH015) Attn: Nancy Scott 410-B Millstone Drive Hillsborough, NC 27278

RE: Laboratory Results for

Project Number: [none], Project Name/Desc: Swift Creek Water Quality

ENCO Workorder(s): C508904

Dear Nancy Scott,

Enclosed is a copy of your laboratory report for test samples received by our laboratory on Friday, July 10, 2015.

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. Results for these procedures apply only to the samples as submitted.

The analytical results contained in this report are in compliance with NELAC standards, except as noted in the project narrative. This report shall not be reproduced except in full, without the written approval of the Laboratory.

This report contains only those analyses performed by Environmental Conservation Laboratories. Unless otherwise noted, all analyses were performed at ENCO Cary. Data from outside organizations will be reported under separate cover.

If you have any questions or require further information, please do not hesitate to contact me.

Bill Scatt

Sincerely,

Bill Scott

Project Manager

Enclosure(s)



#### SAMPLE SUMMARY/LABORATORY CHRONICLE

Client ID: NC 210		Lab ID:	C508904-01	Sampled:	07/10/15 09:05	Received:	07/10/15 11:10
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	e/Time(s)	Analysis Date/	<u>'Time(s)</u>	
EPA 300.0	08/07/15		07/13/15	09:00	07/14/15 02:47		
EPA 310.2	07/24/15		07/13/15	11:10	07/13/15 13:44		
EPA 350.1	08/07/15		07/15/15	07:37	07/15/15 10:56		
EPA 6010C	01/06/16		07/13/15	14:19	07/17/15 10:44		
SM 5310B-2000	08/07/15		07/21/15	13:00	07/21/15 15:19		
Client ID: NC 210 Dissolved		Lab ID:	C508904-02	Sampled:	07/10/15 09:05	Received:	07/10/15 11:10
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	e/Time(s)	Analysis Date/	<u>'Time(s)</u>	
EPA 6010C	01/06/16		07/13/15	14:19	07/17/15 10:46		
Client ID: SR 1555		Lab ID:	C508904-03	Sampled:	07/10/15 09:45	Received:	07/10/15 11:10
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	e/Time(s)	Analysis Date/	<u>'Time(s)</u>	
EPA 300.0	08/07/15		07/13/15	09:00	07/14/15 03:04		
EPA 310.2	07/24/15		07/13/15	11:10	07/13/15 13:44		
EPA 350.1	08/07/15		07/15/15	07:37	07/15/15 10:58		
EPA 6010C	01/06/16		07/13/15	14:19	07/17/15 10:49		
SM 5310B-2000	08/07/15		07/21/15	13:00	07/21/15 15:19		
Client ID: SR 1555 Dissolved		Lab ID:	C508904-04	Sampled:	07/10/15 09:45	Received:	07/10/15 11:10
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	/Time(s)	Analysis Date/	<u>'Time(s)</u>	
EPA 6010C	01/06/16		07/13/15	14:19	07/17/15 11:00		
Client ID: NC-50		Lab ID:	C508904-05	Sampled:	07/10/15 10:15	Received:	07/10/15 11:10
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	e/Time(s)	Analysis Date/	<u>'Time(s)</u>	
EPA 300.0	08/07/15		07/13/15	09:00	07/14/15 03:22		
EPA 310.2	07/24/15		07/13/15	11:10	07/13/15 13:45		
EPA 350.1	08/07/15		07/15/15	07:37	07/15/15 11:00		
EPA 6010C	01/06/16		07/13/15	14:19	07/17/15 11:03		
SM 5310B-2000	08/07/15		07/21/15	13:00	07/21/15 15:19		
Client ID: NC-50 Dissolved		Lab ID:	C508904-06	Sampled:	07/10/15 10:15	Received:	07/10/15 11:10
<u>Parameter</u>	Hold Date/Time(s)		Prep Date	e/Time(s)	Analysis Date/	Time(s)	
EPA 6010C	01/06/16		07/13/15	14:19	07/17/15 11:06		



#### **SAMPLE DETECTION SUMMARY**

Client ID: NC 210			Lab ID:	C508904-01			
<u>Analyte</u>	<u>Results</u>	<u>Flag</u>	<u>MDL</u>	<u>PQL</u>	<u>Units</u>	<u>Method</u>	<u>Notes</u>
Calcium - Total	5590		39.0	100	ug/L	EPA 6010C	
Chloride	7.0		2.2	5.0	mg/L	EPA 300.0	
Copper - Total	1.61	J	1.60	10.0	ug/L	EPA 6010C	
Magnesium - Total	2150		29.0	100	ug/L	EPA 6010C	
Potassium - Total	2500		150	500	ug/L	EPA 6010C	
Sodium - Total	6620		400	500	ug/L	EPA 6010C	
Sulfate as SO4	3.7	J	2.9	5.0	mg/L	EPA 300.0	
otal Alkalinity as CaCO3	22		14	15	mg/L	EPA 310.2	
Total Organic Carbon - Dissolved	5.3		0.34	1.0	mg/L	SM 5310B-2000	
Client ID: SR 1555			Lab ID:	C508904-03			
<u>Analyte</u>	<u>Results</u>	<u>Flag</u>	<u>MDL</u>	<u>PQL</u>	<u>Units</u>	<u>Method</u>	<u>Notes</u>
mmonia as N	0.060	J	0.045	0.10	mg/L	EPA 350.1	
Calcium - Total	6020		39.0	100	ug/L	EPA 6010C	
Chloride	8.0		2.2	5.0	mg/L	EPA 300.0	
1agnesium - Total	2130		29.0	100	ug/L	EPA 6010C	
Potassium - Total	2400		150	500	ug/L	EPA 6010C	
Sodium - Total	7340		400	500	ug/L	EPA 6010C	
Sulfate as SO4	3.8	J	2.9	5.0	mg/L	EPA 300.0	
otal Alkalinity as CaCO3	22		14	15	mg/L	EPA 310.2	
otal Organic Carbon - Dissolved	5.2		0.34	1.0	mg/L	SM 5310B-2000	
Client ID: NC-50			Lab ID:	C508904-05			
<u>nalyte</u>	<u>Results</u>	<u>Flag</u>	<u>MDL</u>	<u>PQL</u>	<u>Units</u>	<u>Method</u>	<u>Notes</u>
mmonia as N	0.069	J	0.045	0.10	mg/L	EPA 350.1	
alcium - Total	7370		39.0	100	ug/L	EPA 6010C	
Chloride	9.3		2.2	5.0	mg/L	EPA 300.0	
lagnesium - Total	2370		29.0	100	ug/L	EPA 6010C	
otassium - Total	2480		150	500	ug/L	EPA 6010C	
odium - Total	7760		400	500	ug/L	EPA 6010C	
ulfate as SO4	4.0	J	2.9	5.0	mg/L	EPA 300.0	
otal Alkalinity as CaCO3	23		14	15	mg/L	EPA 310.2	
otal Organic Carbon - Dissolved	5.9		0.34	1.0	mg/L	SM 5310B-2000	



#### **ANALYTICAL RESULTS**

**Description:** NC 210 **Lab Sample ID:** C508904-01 **Received:** 07/10/15 11:10

 Matrix:
 Water
 Sampled: 07/10/15 09:05
 Work Order: C508904

**Project:** Swift Creek Water Quality Sampled By: Nancy Scott

#### Metals (total recoverable) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	Results	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<b>Analyzed</b>	<u>By</u>	<u>Notes</u>
Cadmium [7440-43-9]^	ND		ug/L	1	0.360	1.00	5G13040	EPA 6010C	07/17/15 10:44	JDH	
Calcium [7440-70-2]^	5590		ug/L	1	39.0	100	5G13040	EPA 6010C	07/17/15 10:44	JDH	
Copper [7440-50-8]^	1.61	J	ug/L	1	1.60	10.0	5G13040	EPA 6010C	07/17/15 10:44	JDH	
Lead [7439-92-1]^	ND		ug/L	1	3.10	10.0	5G13040	EPA 6010C	07/17/15 10:44	JDH	
Magnesium [7439-95-4]^	2150		ug/L	1	29.0	100	5G13040	EPA 6010C	07/17/15 10:44	JDH	
Nickel [7440-02-0]^	ND		ug/L	1	1.80	10.0	5G13040	EPA 6010C	07/17/15 10:44	JDH	
Potassium [7440-09-7]^	2500		ug/L	1	150	500	5G13040	EPA 6010C	07/17/15 10:44	JDH	
Sodium [7440-23-5]^	6620		ug/L	1	400	500	5G13040	EPA 6010C	07/17/15 10:44	JDH	
Zinc [7440-66-6]^	ND		ug/L	1	3.80	10.0	5G13040	EPA 6010C	07/17/15 10:44	JDH	

#### **Classical Chemistry Parameters**

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Ammonia as N [7664-41-7]^	ND		mg/L	1	0.045	0.10	5G15003	EPA 350.1	07/15/15 10:56	SHA	
Chloride [16887-00-6]^	7.0		mg/L	1	2.2	5.0	5G13017	EPA 300.0	07/14/15 02:47	SHA	
Sulfate as SO4 [14808-79-8]^	3.7	J	mg/L	1	2.9	5.0	5G13017	EPA 300.0	07/14/15 02:47	SHA	
Total Alkalinity as CaCO3 [471-34-1]^	22		mg/L	1	14	15	5G13030	EPA 310.2	07/13/15 13:44	SHA	

#### Classical Chemistry Parameters (Dissolved)

^ - ENCO Orlando certified analyte [NC 424]

Analyte [CAS Number]	Results	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Total Organic Carbon^	5.3		mg/L	1	0.34	1.0	5G21008	SM 5310B-2000	07/21/15 15:19	RSA	

**Description:** NC 210 Dissolved **Lab Sample ID:** C508904-02 **Received:** 07/10/15 11:10

**Matrix:** Water **Sampled:** 07/10/15 09:05

**Project:** Swift Creek Water Quality Sampled By: Nancy Scott

### Metals (Dissolved) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	MDL	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<b>Analyzed</b>	<u>By</u>	<u>Notes</u>
Copper [7440-50-8]^	ND		ug/L	1	1.60	10.0	5G13040	EPA 6010C	07/17/15 10:46	JDH	



Work Order: C508904

#### **ANALYTICAL RESULTS**

**Description:** SR 1555 **Lab Sample ID:** C508904-03 **Received:** 07/10/15 11:10

**Matrix:** Water **Sampled:** 07/10/15 09:45

Project: Swift Creek Water Quality Sampled By: Nancy Scott

#### Metals (total recoverable) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Cadmium [7440-43-9]^	ND		ug/L	1	0.360	1.00	5G13040	EPA 6010C	07/17/15 10:49	JDH	
Calcium [7440-70-2]^	6020		ug/L	1	39.0	100	5G13040	EPA 6010C	07/17/15 10:49	JDH	
Copper [7440-50-8]^	ND		ug/L	1	1.60	10.0	5G13040	EPA 6010C	07/17/15 10:49	JDH	
Lead [7439-92-1]^	ND		ug/L	1	3.10	10.0	5G13040	EPA 6010C	07/17/15 10:49	JDH	
Magnesium [7439-95-4]^	2130		ug/L	1	29.0	100	5G13040	EPA 6010C	07/17/15 10:49	JDH	
Nickel [7440-02-0]^	ND		ug/L	1	1.80	10.0	5G13040	EPA 6010C	07/17/15 10:49	JDH	
Potassium [7440-09-7]^	2400		ug/L	1	150	500	5G13040	EPA 6010C	07/17/15 10:49	JDH	
Sodium [7440-23-5]^	7340		ug/L	1	400	500	5G13040	EPA 6010C	07/17/15 10:49	JDH	
Zinc [7440-66-6]^	ND		ug/L	1	3.80	10.0	5G13040	EPA 6010C	07/17/15 10:49	JDH	

#### **Classical Chemistry Parameters**

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Ammonia as N [7664-41-7]^	0.060	J	mg/L	1	0.045	0.10	5G15003	EPA 350.1	07/15/15 10:58	SHA	
Chloride [16887-00-6]^	8.0		mg/L	1	2.2	5.0	5G13017	EPA 300.0	07/14/15 03:04	SHA	
Sulfate as SO4 [14808-79-8]^	3.8	J	mg/L	1	2.9	5.0	5G13017	EPA 300.0	07/14/15 03:04	SHA	
Total Alkalinity as CaCO3 [471-34-1]^	22		mg/L	1	14	15	5G13030	EPA 310.2	07/13/15 13:44	SHA	

#### Classical Chemistry Parameters (Dissolved)

^ - ENCO Orlando certified analyte [NC 424]

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>	
Total Organic Carbon^	5.2		ma/l	1	0.34	1.0	5621008	SM 5310R-2000	07/21/15 15:10	DCV		

**Description:** SR 1555 Dissolved **Lab Sample ID:**C508904-04 **Received:** 07/10/15 11:10

**Matrix:** Water **Sampled:** 07/10/15 09:45

**Project:** Swift Creek Water Quality Sampled By: Nancy Scott

#### Metals (Dissolved) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	MDL	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Copper [7440-50-8]^	ND		ug/L	1	1.60	10.0	5G13040	EPA 6010C	07/17/15 11:00	JDH	



Work Order: C508904

#### **ANALYTICAL RESULTS**

**Description:** NC-50 **Lab Sample ID:** C508904-05 **Received:** 07/10/15 11:10

**Matrix:** Water **Sampled:** 07/10/15 10:15

**Project:** Swift Creek Water Quality Sampled By: Nancy Scott

#### Metals (total recoverable) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	<u>By</u>	<u>Notes</u>
Cadmium [7440-43-9]^	ND		ug/L	1	0.360	1.00	5G13040	EPA 6010C	07/17/15 11:03	JDH	
Calcium [7440-70-2]^	7370		ug/L	1	39.0	100	5G13040	EPA 6010C	07/17/15 11:03	JDH	
Copper [7440-50-8]^	ND		ug/L	1	1.60	10.0	5G13040	EPA 6010C	07/17/15 11:03	JDH	
Lead [7439-92-1]^	ND		ug/L	1	3.10	10.0	5G13040	EPA 6010C	07/17/15 11:03	JDH	
Magnesium [7439-95-4]^	2370		ug/L	1	29.0	100	5G13040	EPA 6010C	07/17/15 11:03	JDH	
Nickel [7440-02-0]^	ND		ug/L	1	1.80	10.0	5G13040	EPA 6010C	07/17/15 11:03	JDH	
Potassium [7440-09-7]^	2480		ug/L	1	150	500	5G13040	EPA 6010C	07/17/15 11:03	JDH	
Sodium [7440-23-5]^	7760		ug/L	1	400	500	5G13040	EPA 6010C	07/17/15 11:03	JDH	
Zinc [7440-66-6]^	ND		ug/L	1	3.80	10.0	5G13040	EPA 6010C	07/17/15 11:03	JDH	

#### **Classical Chemistry Parameters**

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	<u>DF</u>	<u>MDL</u>	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Ammonia as N [7664-41-7]^	0.069	J	mg/L	1	0.045	0.10	5G15003	EPA 350.1	07/15/15 11:00	SHA	
Chloride [16887-00-6]^	9.3		mg/L	1	2.2	5.0	5G13017	EPA 300.0	07/14/15 03:22	SHA	
Sulfate as SO4 [14808-79-8]^	4.0	J	mg/L	1	2.9	5.0	5G13017	EPA 300.0	07/14/15 03:22	SHA	
Total Alkalinity as CaCO3 [471-34-1]^	23		mg/L	1	14	15	5G13030	EPA 310.2	07/13/15 13:45	SHA	

#### Classical Chemistry Parameters (Dissolved)

^ - ENCO Orlando certified analyte [NC 424]

Analyte [CAS Number]	<u>Results</u>	<u>Flag</u>	<u>Units</u>	DF	MDL	<u>PQL</u>	<b>Batch</b>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Total Organic Carbon	ΕO		ma/l	1	0.34	1.0	5621009	CM 5310B-2000	07/21/15 15:10	DCA	

Description: NC-50 Dissolved Lab Sample ID: C508904-06 Received: 07/10/15 11:10

**Matrix:** Water **Sampled:** 07/10/15 10:15

Project: Swift Creek Water Quality Sampled By: Nancy Scott

#### Metals (Dissolved) by EPA 6000/7000 Series Methods

^ - ENCO Cary certified analyte [NC 591]

Analyte [CAS Number]	<b>Results</b>	<u>Flag</u>	<u>Units</u>	DF	<u>MDL</u>	<u>PQL</u>	<u>Batch</u>	<u>Method</u>	<u>Analyzed</u>	By	<u>Notes</u>
Copper [7440-50-8]^	ND		ua/l	1	1.60	10.0	5G13040	FPA 6010C	07/17/15 11:06	1DH	



#### Metals (total recoverable) by EPA 6000/7000 Series Methods - Quality Control

#### Batch 5G13040 - EPA 3005A

**Blank (5G13040-BLK1)** Prepared: 07/13/2015 14:19 Analyzed: 07/17/2015 09:47

Analyte	Result	Flag	POL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Cadmium	0.360	U	1.00	ug/L							
Calcium	39.0	U	100	ug/L							
Copper	1.60	U	10.0	ug/L							
Lead	3.10	U	10.0	ug/L							
Magnesium	29.0	U	100	ug/L							
Nickel	1.80	U	10.0	ug/L							
Potassium	150	U	500	ug/L							
Sodium	400	U	500	ug/L							
Zinc	3.80	U	10.0	ug/L							

LCS (5G13040-BS1) Prepared: 07/13/2015 14:19 Analyzed: 07/17/2015 09:54

<u>Analyte</u>	Result	<u>Flaq</u>	<u>PQL</u>	<u>Units</u>	Spike Level	Source Result	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Cadmium	19.4		1.00	ug/L	20.0	Result	97	80-120	2	<u> </u>	HOLOS
Calcium	2150		100	ug/L	2000		107	80-120			
Copper	194		10.0	ug/L	200		97	80-120			
Lead	206		10.0	ug/L	200		103	80-120			
Magnesium	2030		100	ug/L	2000		102	80-120			
Nickel	201		10.0	ug/L	200		100	80-120			
Potassium	10200		500	ug/L	10000		102	80-120			
Sodium	10200		500	ug/L	10000		102	80-120			
Zinc	200		10.0	ug/L	200		100	80-120			

Matrix Spike (5G13040-MS1) Prepared: 07/13/2015 14:19 Analyzed: 07/17/2015 10:00

Source: C508500-01

					Spike	Source		%REC		RPD	
Analyte	Result	Flag	PQL	Units	Level	Result	%REC	<u>Limits</u>	RPD	<u>Limit</u>	<u>Notes</u>
Cadmium	20.2		1.00	ug/L	20.0	0.360 U	101	75-125			
Calcium	23800		100	ug/L	2000	22300	76	75-125			
Copper	206		10.0	ug/L	200	1.60 U	103	75-125			
Lead	210		10.0	ug/L	200	3.10 U	105	75-125			
Magnesium	7620		100	ug/L	2000	5640	99	75-125			
Nickel	208		10.0	ug/L	200	1.80 U	104	75-125			
Potassium	13800		500	ug/L	10000	3240	105	75-125			
Sodium	16800		500	ug/L	10000	6330	105	75-125			
Zinc	224		10.0	ug/L	200	14.3	105	75-125			

Matrix Spike Dup (5G13040-MSD1) Prepared: 07/13/2015 14:19 Analyzed: 07/17/2015 10:03

Source: C508500-01

<u>Analyte</u>	Result	<u>Flaq</u> <u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Cadmium	19.3	1.00	ug/L	20.0	0.360 U	97	75-125	4	20	
Calcium	23400	100	ug/L	2000	22300	56	75-125	2	20	QM-05
Copper	196	10.0	ug/L	200	1.60 U	98	75-125	5	20	
Lead	207	10.0	ug/L	200	3.10 U	103	75-125	2	20	
Magnesium	7420	100	ug/L	2000	5640	89	75-125	3	20	
Nickel	200	10.0	ug/L	200	1.80 U	100	75-125	4	20	
Potassium	13400	500	ug/L	10000	3240	102	75-125	3	20	
Sodium	16500	500	ug/L	10000	6330	102	75-125	2	20	
Zinc	216	10.0	ug/L	200	14.3	101	75-125	4	20	



П	Metals (total recoverable) by EPA	6000/7000 Series Methods -	Quality Control
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Batch 5G13040 - FPA 3005A - Cont.
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Post Spike (5G13040-PS1)		Prepared: 07/13/2015 14:19 Analyzed: 07/17/2015 10:06											
Source: C508500-01													
Analyte	Result	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes		
Cadmium	0.0194		0.00100	mg/L	0.0200	-0.000121	97	80-120					
Calcium	23.1		0.100	mg/L	2.00	22.3	41	80-120			QM-08		
Copper	0.198		0.0100	mg/L	0.200	0.000135	99	80-120					
Lead	0.201		0.0100	mg/L	0.200	-0.00206	101	80-120					
Magnesium	7.21		0.100	mg/L	2.00	5.64	78	80-120			QM-08		
Nickel	0.202		0.0100	mg/L	0.200	-0.000361	101	80-120					
Potassium	13.0		0.500	mg/L	10.0	3.24	98	80-120					
Sodium	15.9		0.500	mg/L	10.0	6.33	96	80-120					
Zinc	0.221		0.0100	mg/L	0.200	0.0143	103	80-120					
Metals (Dissolved) by EPA 6000/7	7000 Series	Method	s - Quality	Control									

#### Batch 5G13040 - EPA 3005A

Blank (5G13040-BLK2)	Prepared: 07/13/2015 14:19 Analyzed: 07/17/2015 09:51

					Spike	Source		%REC		RPD	
<u>Analyte</u>	<u>Result</u>	<u>Flaq</u>	<u>PQL</u>	<u>Units</u>	Level	Result	%REC	<u>Limits</u>	RPD	<u>Limit</u>	<u>Notes</u>
Copper	1.60	U	10.0	ug/L							

LCS (5G13040-BS1) Prepared: 07/13/2015 14:19 Analyzed: 07/17/2015 09:54

Analyte	Result	Flag	PQL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Copper	194		10.0	ug/L	200		97	80-120			

 Matrix Spike (5G13040-MS1)
 Prepared: 07/13/2015 14:19 Analyzed: 07/17/2015 10:00

Source: C508500-01

<u>Analyte</u>	Result	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Copper	206		10.0	ug/L	200	1.60 U	103	75-125			

 Matrix Spike Dup (5G13040-MSD1)
 Prepared: 07/13/2015 14:19 Analyzed: 07/17/2015 10:03

Source: C508500-01

					Spike	Source		%REC		RPD	
<u>Analyte</u>	Result	<u>Flaq</u>	PQL	<u>Units</u>	Level	Result	%REC	<u>Limits</u>	RPD	<u>Limit</u>	<u>Notes</u>
Copper	196		10.0	ug/L	200	1.60 U	98	75-125	5	20	

**Post Spike (5G13040-PS1)** Prepared: 07/13/2015 14:19 Analyzed: 07/17/2015 10:06

Source: C508500-01

<u>Analyte</u>	Result	Flag	PQL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Notes
Copper	0.198		0.0100	mg/L	0.200	0.000135	99	80-120			

### Classical Chemistry Parameters - Quality Control

#### Batch 5G13017 - NO PREP

**Blank (5G13017-BLK1)** Prepared: 07/13/2015 09:00 Analyzed: 07/13/2015 14:32

Analyte	Result	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	<u>Notes</u>
Chloride	2.2	U	5.0	mg/L							
Sulfate as SO4	2.9	U	5.0	mg/L							



assical Chemistry Parameters											
Batch 5G13017 - NO PREP -	Continued										
LCS (5G13017-BS1)					Prepare	ed: 07/13/201	5 09:00 Anal	yzed: 07/13/	2015 15:27		
nalyte	<u>Result</u>	Flag	<u>POL</u>	<u>Units</u>	Spike Level	Source Result	%REC	%REC	RPD	RPD <u>Limit</u>	No
nloride	54		5.0	mg/L	50.0	Kesuit	108	90-110	5	<u></u>	
ılfate as SO4	52		5.0	mg/L	50.0		104	90-110			
Matrix Spike (5G13017-MS1)					Prepare	ed: 07/13/201	5 09:00 Anal	yzed: 07/13/	2015 15:44		
Source: C508205-01					•			,			
<u>nalyte</u>	Result	Flag	<u>PQL</u>	<u>Units</u>	Spike Level	Source Result	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	No
nloride	25		5.0	mg/L	20.0	5.4	100	90-110		<del></del>	
ılfate as SO4	29		5.0	mg/L	20.0	9.5	97	90-110			
Matrix Spike (5G13017-MS2)					Prepare	ed: 07/13/201	5 09:00 Anal	yzed: 07/13/	2015 16:35		
Source: C508205-02					Snika	Source		0/s DEC		DDD	
nalyte	Result	Flag	POL	Units	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	<u>Nc</u>
nloride	77		5.0	mg/L	20.0	53	118	90-110		<del></del>	QN
Matrix Spike (5G13017-MS3)				<i>J.</i>		ed: 07/13/201	5 09:00 Anal		2015 17:09		-
Source: C508205-02RE1								,			
	p "		DC:		Spike	Source		%REC		RPD	
nalyte	Result	<u>Flaq</u>	<u>PQL</u>	<u>Units</u>	Level	Result	%REC	Limits	RPD	<u>Limit</u>	<u>No</u>
Ilfate as SO4	320		50	mg/L	200	120	100	90-110	2015 16 21		
Matrix Spike Dup (5G13017-M Source: C508205-01	(נעכ)				Prepare	ed: 07/13/201	5 09:00 Anal	yzed: 07/13/	2015 16:01		
	. ·	<b>F</b> 1	DC:		Spike	Source	<b>.</b>	%REC		RPD	
<u>nalyte</u>	Result	<u>Flaq</u>	<u>PQL</u>	<u>Units</u>	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	No
nloride Ilfate as SO4	26 29		5.0 5.0	mg/L mg/L	20.0 20.0	5.4 9.5	101 98	90-110 90-110	0.8 0.6	10 10	
Batch 5G13030 - NO PREP	23		5.0	mg/L	20.0	9.3	90	JU-11U	0.0	10	
Blank (5G13030-BLK1)					Prepare	ed: 07/13/201	5 11:10 Anal	yzed: 07/13/	2015 13:20		
					C"	Carr		0/ 550		DD5	
<u>nalyte</u>	Result	Flag	POL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	No
otal Alkalinity as CaCO3	14	U	15	mg/L							
LCS (5G13030-BS1)					Prepare	ed: 07/13/201	5 11:10 Anal	yzed: 07/13/	2015 13:21		
					Spike	Source		%REC		RPD	
naluto	Result	Flag	<u>POL</u>	<u>Units</u>	Level	Result	%REC	Limits	RPD	<u>Limit</u>	<u>Nc</u>
<u>nalyte</u>					100	<del></del>	104	80-120			
otal Alkalinity as CaCO3	100		15	mg/L	100		101				
	100		15	mg/L		ed: 07/13/201		yzed: 07/13/	2015 13:22		
otal Alkalinity as CaCO3	100		15	mg/L	Prepare			,	2015 13:22		
Matrix Spike (5G13030-MS1) Source: C508205-01		Flag			Prepare <b>Spike</b>	Source	5 11:10 Anal	%REC		RPD Limit	Na
Matrix Spike (5G13030-MS1)  Source: C508205-01  nalyte	<u>Result</u>	Flag	<u>POL</u>	<u>Units</u>	Prepare Spike Level	Source <u>Result</u>	5 11:10 Anal	%REC <u>Limits</u>	2015 13:22 RPD	RPD <u>Limit</u>	<u>Nc</u>
Matrix Spike (5G13030-MS1)  Source: C508205-01  malyte  otal Alkalinity as CaCO3	Result 18	Flag			Spike Level 37.8	Source Result 14 U	5 11:10 Anal %REC 46	%REC <u>Limits</u> 80-120	RPD		<u>Nc</u> Qt
Matrix Spike (5G13030-MS1)  Source: C508205-01  nalyte	Result 18	Flag	<u>POL</u>	<u>Units</u>	Spike Level 37.8	Source <u>Result</u>	5 11:10 Anal %REC 46	%REC <u>Limits</u> 80-120	RPD		
Matrix Spike (5G13030-MS1)  Source: C508205-01  malyte  otal Alkalinity as CaCO3  Matrix Spike Dup (5G13030-M  Source: C508205-01	Result 18 SD1)		<b>POL</b> 15	<u>Units</u> mg/L	Spike Level 37.8 Prepare	Source  Result 14 U  ed: 07/13/201  Source	%REC 46 5 11:10 Anal	%REC <u>Limits</u> 80-120 yzed: 07/13/	<b>RPD</b> 2015 13:24	<u>Limit</u>	QI
Matrix Spike (5G13030-MS1)  Source: C508205-01  malyte  otal Alkalinity as CaCO3  Matrix Spike Dup (5G13030-M	Result 18	Flag Flag U	<u>POL</u>	<u>Units</u>	Spike Level 37.8 Prepare	<b>Source Result</b> 14 U  ed: 07/13/201	5 11:10 Anal %REC 46	%REC <u>Limits</u> 80-120 yzed: 07/13/	RPD	<u>Limit</u>	

FINAL



Blank (5G15003-BLK1)					Prepare	ed: 07/15/201	5 07:37 Anal	yzed: 07/15/	2015 10:06		
					Spike	Source		%REC		RPD	
nalyte	Result	Flag	PQL	Units	Level	Result	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Not
nmonia as N	0.045	U	0.10	mg/L							
LCS (5G15003-BS1)					Prepare	ed: 07/15/201	5 07:37 Anal	yzed: 07/15/	2015 10:08		
					Spike	Source		%REC		RPD	
<u>nalyte</u>	Result	Flag	POL	<u>Units</u>	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Not
nmonia as N	1.0		0.10	mg/L	0.997		102	90-110			
Matrix Spike (5G15003-MS1)					Prepare	ed: 07/15/201	5 07:37 Anal	yzed: 07/15/	2015 10:10		
Source: C508051-02											
nalyte	Result	Flag	POL	Units	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Not
nmonia as N	0.37		0.10	mg/L	0.387	0.045 U	95	90-110			
Matrix Spike (5G15003-MS2)					Prepare	ed: 07/15/201	5 07:37 Anal	yzed: 07/15/	2015 10:23		
Source: C508123-01											
					Spike	Source		%REC		RPD	
nalyte	Result	Flag	PQL	Units	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	<u>Not</u>
nmonia as N	0.77		0.10	mg/L	0.387	0.42	91	90-110			
Matrix Spike Dup (5G15003-M	SD1)				Prepare	ed: 07/15/201	5 07:37 Anal	yzed: 07/15/	2015 10:15		
Source: C508051-02						_		0/ 550			
<u>nalyte</u>	Result	Flag	POL	<u>Units</u>	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Not
nmonia as N	0.37		0.10	mg/L	0.387	0.045 U	95	90-110	0.05	10	
assical Chemistry Parameters (	(Dissolved) -	Ouality	Control								
Batch 5G21008 - NO PREP	,										
Blank (5G21008-BLK1)					Prepare	ed: 07/21/201	5 13:00 Anal	yzed: 07/21/	2015 15:19		
					Spike	Source		%REC		RPD	
nalyte	Result	Flag	PQL	Units	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	Not
tal Organic Carbon	0.34	U	1.0	mg/L							
LCS (5G21008-BS1)					Prepare	ed: 07/21/201	5 13:00 Anal	yzed: 07/21/	2015 15:19		
					C:	<b>6</b>		0/ DEC		222	
nalyte	Result	Flag	POL	<u>Units</u>	Spike Level	Source Result	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	Not
tal Organic Carbon	44		1.0	mg/L	40.0		111	85-115			
Matrix Spike (5G21008-MS1)					Prepare	ed: 07/21/201	5 13:00 Anal	yzed: 07/21/	2015 15:19		
Source: A504272-01											
					Spike	Source		%REC		RPD	
nalyte	Result	Flag	POL 1.0	<u>Units</u>	Level	<u>Result</u>	%REC	<u>Limits</u>	RPD	<u>Limit</u>	<u>Not</u>
htal Organic Carbon  Matrix Spike Dup (5G21008-Ms	45		1.0	mg/L	40.0	1.0	109	85-115	2015 15 12		
	5V1)				Prepare	ed: 07/21/201	5 13:00 Anal	yzea: U//21/	2015 15:19		
Source: A504272-01					Cnika	Source		0/cDEC		ppn	
	Result	Flag	POL	Units	Spike Level	Source <u>Result</u>	%REC	%REC <u>Limits</u>	RPD	RPD <u>Limit</u>	<u>Not</u>



#### **FLAGS/NOTES AND DEFINITIONS**

- **B** The analyte was detected in the associated method blank.
- **D** The sample was analyzed at dilution.
- The reported value is between the laboratory method detection limit (MDL) and the laboratory method reporting limit (MRL), adjusted for actual sample preparation data and moisture content, where applicable.
- **U** The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
- **E** The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate.
- MRL Method Reporting Limit. The MRL is roughly equivalent to the practical quantitation limit (PQL) and is based on the low point of the calibration curve, when applicable, sample preparation factor, dilution factor, and, in the case of soil samples, moisture content.
- **ND** The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
- **N** The analysis indicates the presence of an analyte for which there is presumptive evidence (85% or greater confidence) to make a "tentative identification".
- **P** Greater than 25% concentration difference was observed between the primary and secondary GC column. The lower concentration is reported.
- **QM-05** The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.
- **QM-08** Post-digestion spike did not meet method requirements due to confirmed matrix effects (dilution test).

#### ENVIRONMENTAL CONSERVATION LABORATORIES CHAIN-OF-CUSTODY RECORD 10775 Central Port Dr.

Orlando, FL 32824

(407) 826-5314 Fax (407) 850-6945

4810 Executive Park Court, Suite 211 Jacksonville, FL 32216-6069 (904) 296-3007 Fax (904) 296-6210

102-A Woodwinds Industrial Ct. Cary, NC 27511

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Client Name	(407) 020 0	314 Fax (407) 85		(904) 296-3007	Fax (904) 296-6	210			(919) 46	7-3090 F	ax (919) 46	-3515		P	age of
Client Name  The Catena Group  Address  1000 Corporate Dr. Su  City/ST/Zip  HIIS borough NC 27:  Tel  919 732 1306  Sampler(s) Name, Affiliation (Print)  Name & Scott	ute 101 278	Project Number  Project Name/D  Swift  PO # / Billing Int  Reporting Contact  Billing Contact	CYLLK Io		Quality	Alkalinity 310.2, Chloride	350.	d, Cu, K, Mg, Na, Pb, Zh			TOC SM 810B DISSOIVED TOC			R	equested Turnaround Times  te: Bush requests subject to acceptance by the facility  Standard Expedited
Nancy Scott Sampler(s) Signature  Muscotto		Site Location / T	ime Zone			Alkalin	Ammania	Si, C	Cu/					Lab \	Norkorder 5089 04
Item # Sample ID (Field Identification)	Collection Date	Collection Time	Comp / Grab	Matrix (see codes)	Total # of Containers			Prese	rvation (8	see Codes	) (Combine	as necessary)	Total F		
NC 210 -	7/10/15	9:05		SW	6	X	X	X	X	X	X				Sample Comments
SR 1555		9:45				1	1	1							
NC50	1	10:15		1	1	1	V	1	V	1	V				THE WALLEY
											*				
	2- (10-														
	1,11				EAT OF TOWN										
															THE REST OF BUILDING
						790									B-H-TITE
The state of the s	ate/Time	Relinquishe	d By MA	cott			Date/Time	ontainer		Received	TY	The	2 L	7	Date/Time
Comments/Special Reporting Requirements	in the se	Relinquishe	d By		*		Date/Time			Received				()	Date/Time
THE ROOM OF THE REALITY OF SHIP	or Caranta	Relinquishe					Date/Time			Received	Ву				Date/Time
Matrix : GW-Groundwater SO-Soil DW-Drinking Water	10 34		Temps on Recei		2.5	) c					11311	III O LES	Condition Up	on Receipt	Unacceptable

# Sample Preservation Verification

## **ENCO Cary**



Work Order:

C508904

508904

The Catena Group (TH015)

Logged In: 10-Jul-15 12:54

Project:

Swift Creek Water Quality

Project #:

[none]

Logged By: Jennifer L. Jackson

#### C508904-01

Client:

Cont	Туре	Pres (pH) Requirement	pH Checked / In Control	pH Adjusted	Date/Time Adjusted	Reagent Used/Comments
С	250mLP+H2SO4	<2	1 N / NA	Y (N) NA		
D	250mLP+HNO3	<2	(Y) N / NA	Y / (N) NA		

#### C508904-02

Cont-	Туре	Pres (pH) Requirement	pH Checked / In Control	pH Adjusted	Date/Time Adjusted	Reagent Used/Comments
А	250mLP+HNO3 [F]	<2	YININA	YININA		

#### C508904-03

Cont	Туре	Pres (pH) Requirement	pH Checked / In Control	pH Adjusted	Date/Time Adjusted	Reagent Used/Comments
С	250mLP+H2SO4	<2	N/NA	Y /N/ NA		
D	250mLP+HNO3	<2	1 N / NA	Y / NA NA		

#### C508904-04

Cont	Туре	Pres (pH) Requirement	pH Checked / In Control	pH Adjusted	Date/Time Adjusted	Reagent Used/Comments
А	250mLP+HNO3 [F]	<2	YININA	Y/N/NA		

#### C508904-05

Cont	Туре	Pres (pH) Requirement	pH Checked / In Control	pH Adjusted	Date/Time Adjusted	Reagent Used/Comments
С	250mLP+H2SO4	<2	(Y) N / NA	Y /(N) / NA		
D	250mLP+HNO3	<2	Y / N / NA	Y (N) NA		

#### C508904-06

Cont	Туре	Pres (pH) Requirement	pH Checked / In Control	pH Adjusted	Date/Time Adjusted	Reagent Used/Comments
А	250mLP+HNO3 [F]	<2	Y/N/NA	YININA		

	Reagent Name	ID
1		
2		

eagent Name	ID
4	
	eagent Name

F	Reagent Name	ID
5		
6		

**Appendix C – Historical Water Quality Analysis** 

Table 1. Ammonia measurements and event-specific acute and chronic criteria (USEPA 2013) at City of Raleigh monitoring station J4500000.

<u>Date</u>	Temp (°C)	pH (SU)	NH3 as N (mg/L)	<u>CMC</u>	CCC
8/19/2009	25.2	7.1	0.08	9.86	1.29
9/2/2009	21.7	7.1	0.42	13.18	1.62
10/28/2009	16.1	7.3	0.02	16.68	2.08
11/24/2009	13.3	6.7	0.14	29.76	3.17
12/31/2009	4.9	6.4	0.03	33.74	5.70
1/22/2010	7.1	6.5	0.07	32.61	4.89
2/26/2010	5.4	7	0.01	24.10	4.84
3/31/2010	13.8	6.6	0.06	31.28	3.13
4/8/2010	20.1	7.1	0.13	15.05	1.80
5/27/2010	20.5	6.9	0.08	17.39	1.89
6/24/2010	26.7	7.1	0.23	8.71	1.17
7/23/2010	26.3	6.7	0.26	12.25	1.37
8/27/2010	24.4	7	0.17	11.59	1.42
9/10/2010	21.8	7.2	0.12	11.74	1.53
10/22/2010	13.5	7	0.08	24.10	2.87
11/19/2010	9.8	7.2	0.35	19.73	3.32
12/22/2010	5.3	7	0.01	24.10	4.87
1/20/2011	4.3	6.8	3.73	28.05	5.53
2/10/2011	6	7.1	0.22	21.94	4.46
3/3/2011	10.3	6.9	0.05	26.15	3.65
5/17/2011	20.4	7	0.11	16.15	1.84
6/10/2011	25.1	7	0.11	10.94	1.36
7/29/2011	26.8	7.3	0.51	6.87	1.05
8/11/2011	26.1	7.1	0.14	9.16	1.22
9/12/2011	22.5	7.3	0.14	9.81	1.38
10/21/2011	15.1	7.2	0.08	19.73	2.36
11/10/2011	11.8	7.3	0.05	17.51	2.75
12/30/2011	7.8	7.2	0.05	19.73	3.78
1/12/2012	7.6	7.1	0.07	21.94	4.03
2/23/2012	5.8	7.2	0.06	19.73	4.30
3/8/2012	8	7.1	0.04	21.94	3.92
4/26/2012	15.4	7.2	0.06	19.73	2.32
5/10/2012	18.9	7.2	0.05	14.93	1.85
7/31/2012	25.1	6.8	0.27	12.75	1.45
8/16/2012	22.8	6.9	0.19	14.37	1.63
9/11/2012	22.1	6.8	0.08	16.34	1.76
10/4/2012	21.6	7	1.88	14.62	1.70
11/12/2012	10.6	6.7	0.03	29.76	3.77
12/12/2012	11.5	6.9	0.07	26.15	3.38
1/23/2013	6.2	6.5	0.06	32.61	5.18
2/14/2013	9	6.8	0.10	28.05	4.08
3/14/2013	9.4	7.1	0.08	21.94	3.58
4/8/2013	14.5	6.9	0.05	26.15	2.79
5/7/2013	17.8	7.4	0.09	12.67	1.74
6/13/2013	25.1	7.1	0.11	9.95	1.30
7/10/2013	26.4	6.8	0.12	11.44	1.33

Date	Temp (°C)	pH (SU)	NH3 as N (mg/L)	CMC	CCC
8/6/2013	25.6	6.8	0.11	12.23	1.40
9/10/2013	26.4	7.1	0.05	8.93	1.20
10/24/2013	12.9	7	0.10	24.10	2.98
11/7/2013	14.2	6.9	0.05	26.15	2.84
12/5/2013	10.4	7.2	0.08	19.73	3.20
1/16/2014	7.5	6.7	0.02	29.76	4.61
2/14/2014	2.7	6.9	0.02	26.15	5.96
3/10/2014	8.4	6.8	0.04	28.05	4.25
4/10/2014	15.4	6.9	0.04	26.15	2.63
5/13/2014	22.1	7	0.15	14.02	1.65
6/26/2014	27.3	7	0.13	9.11	1.18
7/24/2014	25.8	7.1	0.11	9.39	1.25
8/6/2014	25.2	7.1	0.08	9.86	1.29
9/3/2014	26.1	7.1	0.09	9.16	1.22
10/16/2014	20.2	7	0.08	16.42	1.86
11/17/2014	8.9	7.3	0.05	17.51	3.32
12/30/2014	9.9	7.4	0.03	15.34	2.90
1/12/2015	7	6.9	0.12	26.15	4.52
2/3/2015	7.5	7.2	0.05	19.73	3.85
3/3/2015	7.1	7.3	0.03	17.51	3.72
4/7/2015	17.1	7.4	0.06	13.42	1.82

Table 2. Ammonia measurements and event-specific acute and chronic criteria (USEPA 2013) at City of Raleigh monitoring station J4510000.

monitoring sta <u>Date</u>	Temp(°C)	pH (SU)	NH3 as N (mg/L)	CMC	CCC
8/19/2009	26.0	7.2	0.08	8.29	1.17
9/2/2009	22.9	7.1	0.20	11.94	1.50
10/28/2009	16.9	7.2	0.01	17.62	2.10
11/24/2009	13.5	6.6	0.18	31.28	3.19
12/31/2009	5.3	6.5	0.04	32.61	5.49
1/22/2010	7.5	6.6	0.41	31.28	4.69
2/26/2010	6.0	6.8	0.02	28.05	4.96
3/31/2010	14.4	6.6	0.05	31.28	3.01
4/8/2010	20.4	7.0	0.16	16.15	1.84
5/27/2010	21.0	6.9	0.11	16.68	1.83
6/24/2010	26.8	7.0	0.10	9.50	1.22
7/23/2010	26.4	7.0	0.09	9.82	1.25
8/27/2010	24.5	6.9	0.16	12.48	1.46
9/10/2010	22.1	7.1	0.13	12.75	1.58
10/22/2010	13.6	7.1	0.08	21.94	2.73
11/19/2010	10.2	7.2	0.18	19.73	3.24
12/22/2010	5.5	7.0	0.02	24.10	4.81
1/20/2011	4.4	7.0	0.40	24.10	5.16
2/10/2011	6.1	7.0	0.12	24.10	4.62
3/3/2011	10.6	6.9	0.07	26.15	3.58
5/17/2011	20.9	7.2	0.09	12.65	1.62
6/10/2011	25.0	6.9	0.11	11.97	1.42
7/29/2011	26.7	7.2	0.28	7.82	1.12
8/11/2011	26.4	7.0	0.10	9.82	1.25
9/12/2011	22.3	7.2	0.07	11.26	1.48
10/21/2011	14.8	7.1	0.04	21.94	2.53
11/10/2011	10.7	6.8	0.02	28.05	3.66
12/30/2011	7.3	6.9	0.04	26.15	4.43
1/12/2012	7.7	7.3	0.05	17.51	3.58
2/23/2012	5.9	7.2	0.09	19.73	4.27
3/8/2012	8	7.3	0.07	17.51	3.51
4/26/2012	15.3	7.1	0.11	21.94	2.45
5/10/2012	18.8	7.2	0.05	15.05	1.86
7/31/2012	24.9	6.9	0.1	12.07	1.42
8/16/2012	22.5	6.9	0.09	14.73	1.66
9/11/2012	21.2	6.8	0.06	17.61	1.86
10/4/2012	20.6	6.9	0.09	17.24	1.88
11/12/2012	10	6.9	0.09	26.15	3.72
12/12/2012	10.8	6.9	0.03	26.15	3.54
1/23/2013	4	6.9	0.07	26.15	5.48
2/14/2013	8.4	7	0.26	24.10	3.99
3/14/2013	9	6.9	0.05	26.15	3.97
4/8/2013	13.6	6.7	0.03	29.76	3.11
5/7/2013	17.3	6.9	0.15	22.67	2.33
6/13/2013	24.7	6.8	0.08	13.17	1.48
7/10/2013	24.3	6.8	0.12	13.62	1.52

Date	Temp(°C)	pH (SU)	NH3 as N (mg/L)	CMC	CCC
8/6/2013	24.4	6.9	0.05	12.59	1.47
9/10/2013	24.7	6.8	0.03	13.17	1.48
10/24/2013	12.2	6.7	0.03	29.76	3.40
11/7/2013	14	6.7	0.04	29.76	3.03
12/5/2013	10.4	7.2	0.05	19.73	3.20
1/16/2014	7.1	6.6	0.04	31.28	4.82
2/14/2014	2.1	6.9	0.03	26.15	6.19
3/10/2014	8.1	6.8	0.09	28.05	4.33
4/10/2014	14.6	6.7	0.05	29.76	2.91
5/13/2014	21.4	7	0.09	14.86	1.72
6/26/2014	25	6.8	0.09	12.85	1.46
7/24/2014	24.1	6.9	0.08	12.90	1.50
8/6/2014	24.2	6.8	0.09	13.73	1.53
9/3/2014	24.4	6.9	0.08	12.59	1.47
10/16/2014	18.8	6.9	0.03	20.02	2.11
11/17/2014	7.8	7.2	0.07	19.73	3.78
12/30/2014	9.3	7.1	0.02	21.94	3.61
1/12/2015	5.4	7	0.1	24.10	4.84
2/3/2015	6.6	7.3	0.08	17.51	3.85
3/3/2015	6.6	7.2	0.03	19.73	4.08
4/7/2015	16	7.2	0.07	18.98	2.23

Table 3 Ammonia measurements and event-specific acute and chronic criteria (USEPA 2013) at City of Raleigh monitoring station J4511000.

Date	Temp (°C)	pH (SU)	NH3 as N (mg/L)	CMC	CCC
8/19/2009	26.3	7.1	0.27	9.01	1.21
9/2/2009	23.3	7.1	0.21	11.55	1.46
10/28/2009	17.2	7.1	0.01	19.14	2.17
11/24/2009	14.0	6.8	0.23	28.05	2.96
12/31/2009	5.9	6.6	0.05	31.28	5.20
1/22/2010	8.0	6.5	0.09	32.61	4.61
2/26/2010	6.2	6.7	0.01	29.76	5.01
3/31/2010	14.8	6.7	0.64	29.76	2.88
4/8/2010	21.1	7.1	0.04	13.86	1.69
5/27/2010	21.5	6.8	0.09	17.18	1.82
6/24/2010	27.3	6.8	0.20	10.62	1.26
7/23/2010	27.0	6.7	0.42	11.56	1.31
8/27/2010	24.2	7.0	0.18	11.78	1.44
9/10/2010	21.7	7.1	0.20	13.18	1.62
10/22/2010	13.1	7.0	0.10	24.10	2.94
11/19/2010	9.7	7.1	0.04	21.94	3.52
12/22/2010	5.1	7.2	0.02	19.73	4.50
1/20/2011	4.6	7.1	0.32	21.94	4.88
2/10/2011	6.3	7.1	0.10	21.94	4.38
3/3/2011	11.0	7.1	0.09	21.94	3.23
5/17/2011	20.7	6.9	0.10	17.10	1.87
6/10/2011	25.2	6.8	0.13	12.64	1.44
7/29/2011	27.0	7.1	0.86	8.50	1.15
8/11/2011	26.6	7.1	0.20	8.78	1.18
9/12/2011	22.5	7.2	0.18	11.08	1.46
10/21/2011	14.7	7.2	0.07	19.73	2.42
11/10/2011	13.2	7.0	0.05	24.10	2.93
12/30/2011	8.3	7.1	0.02	21.94	3.85
1/12/2012	8.1	7.2	0.02	19.73	3.71
2/23/2012	6.0	7.1	0.05	21.94	4.46
3/8/2012	8.4	7	0.02	24.10	3.99
4/26/2012	15.1	7.3	0.07	17.51	2.22
5/10/2012	19	7	0.05	18.13	2.01
7/31/2012	25.2	6.9	0.05	11.78	1.40
8/16/2012	22.3	6.8	0.28	16.07	1.73
9/11/2012	21.3	6.9	0.09	16.27	1.80
10/4/2012	20.6	6.9	0.04	17.24	1.88
11/12/2012	9.9	6.8	0.09	28.05	3.85
12/12/2012	10.9	6.8	0.03	28.05	3.61
1/23/2013	6.6	6.8	0.07	28.05	4.77
2/14/2013	8.9	7.1	0.09	21.94	3.70
3/14/2013	9.2	6.8	0.04	28.05	4.03
4/8/2013	13.4	6.9	0.09	26.15	2.99
5/7/2013	16.9	7	0.11	21.58	2.30
6/13/2013	24.5	6.8	0.28	13.39	1.50
7/10/2013	24.2	6.9	0.07	12.80	1.49

Date	Temp (°C)	pH (SU)	NH3 as N (mg/L)	CMC	CCC
8/6/2013	24.3	6.9	0.06	12.69	1.48
9/10/2013	24.6	6.9	0.09	12.38	1.45
10/24/2013	12.3	6.8	0.02	28.05	3.30
11/7/2013	13.9	6.9	0.02	26.15	2.89
12/5/2013	8.8	7.1	0.08	21.94	3.73
1/16/2014	7	6.8	0.05	28.05	4.65
2/14/2014	2.2	6.9	0.02	26.15	6.16
3/10/2014	8.2	6.9	0.08	26.15	4.18
4/10/2014	14.7	6.8	0.02	28.05	2.83
5/13/2014	21.3	6.9	0.07	16.27	1.80
6/26/2014	25	6.9	0.09	11.97	1.42
7/24/2014	24.3	7	0.09	11.69	1.43
8/6/2014	24.4	6.8	0.07	13.51	1.51
9/3/2014	24.9	6.9	0.05	12.07	1.42
10/16/2014	19	6.8	0.09	21.13	2.14
11/17/2014	8.2	7.1	0.11	21.94	3.87
12/30/2014	9.7	6.9	0.05	26.15	3.80
1/12/2015	5.5	6.8	0.08	28.05	5.12
2/3/2015	6.7	7	0.1	24.10	4.45
3/3/2015	6.8	7	0.03	24.10	4.42
4/7/2015	16.2	7.1	0.04	20.80	2.31

Table 4 Ammonia measurements and event-specific acute and chronic criteria (USEPA 2013) at City of Raleigh monitoring station J4520000.

	tion J4520000. Temp (°C)	pH (SU)	NH3 as N (mg/L)	CMC	CCC
<u>Date</u> 8/19/2009		6.9	0.13	9.90	1.22
	27.3				
9/2/2009	23.8 17.6	7.0	0.23	12.18	1.48
10/28/2009		7.2	0.01	16.62 29.76	2.01
	14.2	6.7	0.22		2.99
1/22/2010	6.0	6.5	0.02	32.61	5.25
1/22/2010	8.2	6.6	0.08	31.28	4.49
2/26/2010 3/31/2010	6.3	6.9	0.01	26.15	4.73
	15.1	6.8	0.04	28.05 14.74	2.76
4/8/2010	21.5 21.7	7.0	0.20 0.09		1.71
5/27/2010		6.9		15.74	
6/24/2010	26.7	6.8	0.11	11.16	1.30
7/23/2010 8/27/2010	26.2 24.9	6.8 7.1	0.13 0.12	11.63 10.11	1.35
	22.4				
9/10/2010	13.7	7.0	0.15 0.07	13.68 19.73	1.62 2.58
11/19/2010	10.3	7.2	0.06	19.73	3.22
12/22/2010	5.5	7.1	0.03	21.94	4.61
1/20/2011	4.9	7.1	0.03	24.10	5.00
2/10/2011	6.0	7.0	0.43	19.73	4.24
3/3/2011	11.3	7.2	0.05	21.94	3.17
5/17/2011	21.1	6.9	0.09	16.54	1.82
6/10/2011	25.4	6.7	0.08	13.20	1.45
7/29/2011	27.4	7.0	0.17	9.04	1.17
8/11/2011	26.3	7.0	0.09	9.90	1.26
9/12/2011	22.4	7.1	0.08	12.44	1.55
10/21/2011	15.1	7.0	0.05	24.10	2.59
11/10/2011	11.3	6.9	0.03	26.15	3.42
12/30/2011	7.6	7.0	0.05	24.10	4.20
1/12/2012	7.7	7.1	0.05	21.94	4.00
2/23/2012	5.9	7.3	0.07	17.51	4.02
3/8/2012	8.1	7.2	0.04	19.73	3.71
4/26/2012	15.6	7	0.24	24.03	2.51
5/10/2012	19.2	7	0.05	17.83	1.99
7/31/2012	25.5	6.8	0.08	12.33	1.41
8/16/2012	22.8	6.9	0.08	14.37	1.63
9/11/2012	21.4	6.6	0.05	19.34	1.92
10/4/2012	21	6.8	0.04	17.90	1.88
11/12/2012	10	6.7	0.02	29.76	3.92
12/12/2012	10.8	6.7	0.05	29.76	3.72
1/23/2013	4.3	6.8	0.05	28.05	5.53
2/14/2013	9.3	7.1	0.11	21.94	3.61
3/14/2013	9.5	6.7	0.07	29.76	4.05
4/8/2013	13.7	7	0.04	24.10	2.83
5/7/2013	17.4	7.1	0.1	18.83	2.14
6/13/2013	25.3	6.8	0.17	12.54	1.43
7/10/2013	24.5	6.9	0.1	12.48	1.46

Date	Temp (°C)	pH (SU)	NH3 as N (mg/L)	CMC	CCC
8/6/2013	24.9	6.8	0.05	12.96	1.47
9/10/2013	25.3	7	0.02	10.76	1.34
10/24/2013	12.2	6.9	0.02	26.15	3.23
11/7/2013	14.2	7	0.05	24.10	2.74
12/5/2013	9.9	6.8	0.04	28.05	3.85
1/16/2014	7.2	6.9	0.07	26.15	4.46
2/14/2014	1.9	6.8	0.06	28.05	6.46
3/10/2014	8.4	6.8	0.07	28.05	4.25
4/10/2014	14.5	6.7	0.03	29.76	2.93
5/13/2014	21	7.1	0.07	13.97	1.70
6/26/2014	24.8	7.1	0.07	10.20	1.33
7/24/2014	24	7.1	0.05	10.90	1.40
8/6/2014	23.4	6.9	0.09	13.67	1.57
9/3/2014	24.3	7	0.06	11.69	1.43
10/16/2014	18.8	6.9	0.06	20.02	2.11
11/17/2014	7.8	7.3	0.03	17.51	3.56
12/30/2014	9.9	6.9	0.05	26.15	3.75
1/12/2015	5.3	6.8	0.11	28.05	5.19
2/3/2015	6.3	6.8	0.08	28.05	4.86
3/3/2015	6.4	7.1	0.14	21.94	4.35
4/7/2015	15.9	7	0.05	23.44	2.46

Table 5 Ammonia measurements and event-specific acute and chronic criteria (USEPA 2013) at City of Raleigh monitoring station J4580000.

monitoring station J4580000.						
<u>Date</u>	Temp (°C	pH (SU)	NH3 as N (mg/L)	<u>CMC</u>	<u>CCC</u>	
5/2/2012	21.50	6.9	0.07	16.00	1.77	
7/19/2012	26.2	6.9	0.05	10.84	1.31	
8/2/2012	25.60	6.9	0.07	11.39	1.36	
9/13/2012	20.20	6.9	0.06	17.83	1.93	
10/3/2012	21.20	6.9	0.07	16.41	1.81	
11/28/2012	6.10	6.8	0.04	28.05	4.92	
12/20/2012	8.60	6.7	0.02	29.76	4.29	
1/11/2013	9.70	6.8	0.05	28.05	3.90	
2/7/2013	7.00	7.0	0.06	24.10	4.36	
3/13/2013	10.10	7.1	0.07	21.94	3.43	
4/4/2013	10.80	6.9	0.03	26.15	3.54	
5/8/2013	16.00	7.2	0.10	18.98	2.23	
6/19/2013	22.10	7.2	0.05	11.45	1.50	
7/2/2013	23.90	7.1	0.08	10.99	1.41	
8/5/2013	24.10	7.1	0.05	10.81	1.39	
9/9/2013	22.50	7.1	0.04	12.34	1.54	
10/17/2013	17.90	6.7	0.02	24.58	2.36	
11/6/2013	12.90	7.1	0.16	21.94	2.86	
12/4/2013	8.20	6.7	0.08	29.76	4.40	
1/8/2014	1.70	6.8	0.08	28.05	6.54	
2/6/2014	6.60	6.9	0.07	26.15	4.63	
3/6/2014	4.40	6.9	0.05	26.15	5.34	
4/7/2014	14.10	6.8	0.02	28.05	2.94	
5/12/2014	20.60	7.0	0.05	15.88	1.82	
6/12/2014	22.70	7.1	0.04	12.14	1.52	
7/17/2014	23.00	7.0	0.06	13.02	1.56	
8/5/2014	23.10	6.9	0.10	14.02	1.60	
9/2/2014	26.00	6.9	0.05	11.02	1.33	
10/9/2014	19.20	7.2	0.02	14.56	1.81	
11/6/2014	15.90	7.1	0.10	21.32	2.36	
12/4/2014	10.20	7.1	0.04	21.94	3.40	
1/14/2015	5.80	7.2	0.08	19.73	4.30	
2/12/2015	6.10	7.3	0.06	17.51	3.97	
3/18/2015	12.40	7.1	0.03	21.94	2.95	
4/6/2015	14.10	7.2	0.02	19.73	2.52	

Table 6. Ammonia measurements and event-specific acute and chronic criteria (USEPA 2013) at USGS monitoring station 02087701.

<u>Date</u>	Temp (°C)	pH (SU)	NH3 as N (mg/L)	<u>CMC</u>	CCC
10/18/1989	22	6.6	0.05	18.43	1.84
4/4/1990	15	6.7	0.04	29.76	2.84
6/20/1990	28	7.2	0.02	7.07	1.03
8/14/1990	30	8.3	0.03	0.96	0.26
9/5/1990	27.6	7.8	0.01	3.00	0.62
10/24/1990	22	6.9	0.02	15.41	1.72
4/25/1991	18	6.7	0.06	24.43	2.34
6/11/1991	25	8.6	0.02	0.81	0.21
7/23/1991	33	7.3	0.04	4.14	0.70
8/6/1991	28	7.1	0.2	7.86	1.08
9/17/1991	27	7.2	0.02	7.68	1.10
11/13/1991	10	6.5	0.07	32.61	4.06
4/16/1992	16	7.2	0.02	19.11	2.23
6/2/1992	22	7	0.02	14.20	1.66
8/13/1992	30	6.5	0.14	9.90	1.12
10/15/1992	21	7.2	0.06	12.63	1.61
4/26/1993	18	7.2	0.03	16.19	1.96
6/25/1993	27.1	6.7	0.04	11.49	1.30
8/4/1993	28.8	7	0.05	8.08	1.07
10/14/1993	17.3	7	0.11	20.96	2.25
11/15/1993	14.3	7.1	0.01	21.94	2.61
4/22/1994	20.9	7	0.03	15.56	1.78
6/21/1994	28.8	7.2	0.02	6.61	0.98
8/2/1994	28.1	6.9	0.04	9.29	1.16
9/21/1994	23.3	6.6	0.19	16.55	1.69
6/16/1995	23.6	6.5	0.02	16.82	1.69
8/5/2005	29	6.9	0.015	8.62	1.09
8/5/2005	27.6	6.9	0.158	9.68	1.20
10/19/2005	19.9	6.7	0.044	20.87	2.07
4/20/2006	17.5	6.3	0.09	29.69	2.56
7/5/2006	29.6	6.7	0.012	9.34	1.11
7/5/2006	22.7	6.1	0.055	20.11	1.85
8/30/2006	31.7	8.5	0.014	0.56	0.16
8/30/2006	28.2	6.3	0.027	12.23	1.28
8/30/2006	23.8	6.7	1.74	15.10	1.61
4/26/2007	15.5	5.5	0.047	38.25	3.01
6/21/2007	26.2	6.4	0.042	14.03	1.44
6/21/2007	23.2	6.7	0.625	15.87	1.67
11/1/2007	16.7	6.8	0.067	25.64	2.49

<u>Date</u>	Temp (°C)	pH (SU)	NH3 as N (mg/L)	<u>CMC</u>	CCC
11/1/2007	16.5	6.7	0.075	27.66	2.58
11/1/2007	16.4	6.8	0.088	26.28	2.54
4/28/2008	17.5	6.6	0.029	26.76	2.46
6/25/2008	25.5	7	0.131	10.62	1.32
8/21/2008	25.9	6.9	0.07	11.15	1.34
6/25/2009	22.3	6.6	0.208	17.98	1.81
8/20/2009	28.2	6.6	0.155	11.02	1.24
8/20/2009	24.7	7	2.1	11.35	1.39
10/15/2009	19.4	6.8	0.048	20.50	2.09
10/15/2009	19.4	6.9	0.06	19.11	2.03
4/15/2010	17.5	6.5	0.118	27.90	2.50
6/10/2010	28.1	6.9	0.027	9.29	1.16
6/10/2010	20.8	7.2	1.28	12.84	1.63
8/12/2010	31.5	7.2	0.099	5.29	0.82
8/12/2010	29.6	6.8	0.195	8.80	1.08
10/14/2010	21.2	7	0.078	15.17	1.75
10/14/2010	21.1	6.8	0.079	17.80	1.87
4/25/2011	20.8	6.8	0.081	18.25	1.91
4/25/2011	19.4	6.6	0.107	22.86	2.18
6/28/2011	28.5	7	0.123	8.28	1.09
6/28/2011	28.5	6.9	0.137	8.99	1.13

Table 7 Copper measurements and event-specific acute and chronic water quality standards (USEPA 2007, NC Register 2014) at USGS monitoring station 02087701.

<u>Date</u>	Dissolved Cu (ug/L)	Hardness (as mg/L of CaCO <sub>3</sub> )	<u>CMC</u>	<u>CCC</u>
10/18/1989	0.96	17.7	2.63	2.04
4/4/1990	2.88	22.5	3.30	2.50
6/20/1990	2.88	22.4	3.28	2.49
8/14/1990	2.88	19.6	2.89	2.23
9/5/1990	5.76	19.6	2.89	2.23
9/5/1990	2.88	18.6	2.75	2.13
10/24/1990	1.92	22.2	3.25	2.47
4/25/1991	2.88	22.9	3.35	2.54
6/11/1991	1.92	20.1	2.96	2.27
7/23/1991	1.92	21.6	3.17	2.42
8/6/1991	3.84	19.2	2.84	2.19
9/17/1991	2.88	19	2.81	2.17
4/16/1992	4.8	23.8	3.48	2.63
6/2/1992	0.96	22.9	3.35	2.54
8/13/1992	1.92	16.8	2.50	1.95
10/15/1992	0.96	17.5	2.60	2.02
4/26/1993	1.92	28.2	4.08	3.04
6/25/1993	1.92	30.5	4.39	3.25
8/4/1993	0.96	22.3	3.27	2.48
10/14/1993	0.96	20.5	3.02	2.31
11/15/1993	0.96	20.3	2.99	2.29
4/22/1994	1.92	25.6	3.72	2.80
6/21/1994	1.92	24.2	3.53	2.66
8/2/1994	1.92	19.6	2.89	2.23
12/6/1994	3.84	21.6	3.17	2.42
5/1/1995	1.92	15.9	2.38	1.86
6/16/1995	1.92	20.8	3.06	2.34
10/19/2005	0.768	22.6	3.31	2.51
4/20/2006	1.248	16.7	2.49	1.94
4/26/2007	1.536	26.1	3.79	2.84
10/15/2009	2.592	20.2	2.98	2.28
4/15/2010	8.352	22.1	3.24	2.47
10/14/2010	1.728	18.8	2.78	2.15
4/25/2011	1.344	22.7	3.32	2.52