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**MS4 WATER QUALITY SAMPLING 2010 ANNUAL REPORT  
FORT CARSON, COLORADO**



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## LIST OF ACRONYMS AND ABBREVIATIONS

°F	degree Fahrenheit
BD	B-Ditch
CD	Clover Ditch
CDPHE	Colorado Department of Public Health and Environment
cfu/0.1 L	colony forming units per 0.1 liter
COC	chain-of-custody
CUD	Central Unnamed Ditch
<i>E. coli</i>	<i>Escherichia coli</i>
EPA	U.S. Environmental Protection Agency
Fort Carson	Fort Carson Military Reservation
ID	identification
J	value estimated
MDL	method detection limit
µg/L	micrograms per liter
mg/L	milligrams per liter
MS4	municipal separate storm sewer systems
Q1	first quarter
Q2	second quarter
Q3	third quarter
Q4	fourth quarter
QC	quality control
RC	Rock Creek
Work Plan	<i>MS4 Quarterly Water Quality Sampling Work Plan</i>

## **EXECUTIVE SUMMARY**

Fort Carson Military Reservation (Fort Carson) fulfilled its Municipal Separate Storm Sewer System Program sampling requirements for B-Ditch, Clover Ditch, Central Unnamed Ditch, and Rock Creek by collecting four quarters of surface water samples up gradient and down gradient of the Post as the streams enters and leave Fort Carson. Sampling was conducted in March, June, September, and November of 2010. Nine sample locations were identified, five up gradient and four down gradient. Samples were not collected when drainages were dry. All four quarters of samples were collected at the MS4-BD2, MS4-CD1, MS4-CUD4, and MS4-RC2 sites. Three quarters of samples were collected at MS4-CUD3 (first quarter [Q1], second quarter [Q2], and third quarter [Q3]). One sample was collected at MS4-BD1 (Q1), and MS4-RC1 (Q2). No samples were collected at MS4-CUD1 and MS4-CUD2 due to dry conditions.

Sample results from the up gradient B-Ditch site, MS4-BD1 did not exceed screening criteria during any sampling event in 2010. Results from the down gradient B-Ditch site, MS4-BD2 exceeded screening criteria for nitrate (Q2, Q3, and fourth quarter [Q4]), selenium (Q2, Q3, and Q4), and fecal coliforms (Q2). The only Clover Ditch sample site, MS4-CD1 was a down gradient site as the ditch leaves the Post. Sample results from MS4-CD1 exceeded screening criteria for ammonia (Q4), nitrate (Q3 and Q4), and fecal coliforms (Q2, Q3, and Q4). Sample results from the up gradient Central Unnamed Ditch site, MS4-CUD3 exceeded screening criteria for fecal coliforms (Q3). Sample results from the down gradient Central Unnamed Ditch site, MS4-CUD4 exceeded screening criteria for aluminum (Q4), and iron (Q3 and Q4). Sample results from both the up gradient (MS4-RC1) and down gradient (MS4-RC2) Rock Creek sites did not exceed screening criteria during any sampling event in 2010.

## 1. INTRODUCTION AND BACKGROUND

As part of Fort Carson Municipal Separate Storm Sewer Systems (MS4) Program, quarterly water quality samples were collected to determine the quality of the surface water entering and exiting the Post. This *MS4 Annual Water Quality Sampling Report* summarizes the field efforts and results from the four 2010 sampling events. This sampling event supports the Fort Carson Directorate of Public Works Environmental Division Stormwater Program in performing activities related to the MS4 permit and overall watershed management at Fort Carson, Colorado. The study area includes four streams: B-Ditch, Central Unnamed Ditch, Clover Ditch, and Rock Creek. The study area is located entirely within the Cantonment Area of Fort Carson. This report was prepared for Fort Carson under U.S. Army Corps of Engineers, Norfolk District, Contract No. W91236-09-D-0075 / D001.

Water bodies within Colorado are classified by the Colorado Department of Public Health and Environment (CDPHE) Water Quality Control Commission. The streams on Fort Carson are classified as Stream Segment 4 of the Fountain Creek Basin. Segment 4 is classified as aquatic life warm 2, recreation E, and agriculture uses. Recreation classification E means the waters are used for primary contact recreation or have been used for such activities since November 28, 1975. Class 2 aquatic life waters are those that are not capable of sustaining a wide variety of cold or warm water biota, including sensitive species, due to physical habitat, water flows or levels, or uncorrectable water quality conditions that result in substantial impairment of the abundance and diversity of species. Fountain Creek, the primary receiving water for the streams on Fort Carson, is considered to be within stream Segment 2a of the Fountain Creek Basin. This segment is classified for water supply, aquatic life warm 2, recreation E, and agriculture uses. The portion of the Central Unnamed Ditch located downstream of the Fort Carson boundary and upstream of Fountain Creek is considered Segment 5 of the Fountain Creek Basin. This segment is classified for aquatic life cold 2, recreation N, and agriculture. Recreation classification N means it is surface water that is not suitable or intended to become suitable for primary contact recreation uses (CDPHE 2009, and CDPHE 2010).

Sampling was conducted within the drainages at nine locations upstream and downstream of the post. The general location map is shown on Figure 1-1. Sample locations are shown on

Figure 1-2, and the coordinates are given in Table 1-1. Photographs of the sample locations are included in Appendix A.

The intent of this upstream and downstream sampling is to determine the chemical composition of the stream water flowing onto and off of Fort Carson. This sampling supports the Fort Carson MS4 Program and meets the requirements set forth in Fort Carson's *Stormwater Management Plan* (AECOM 2010a).

## 2. SAMPLE PARAMETERS AND METHODOLOGIES

Laboratory analysis was performed by the following methods for the associated analytes:

- Method SM 2320B Total Alkalinity
- Method SM 2510B Conductivity, Specific Conductance
- Method SM 2540C Total Dissolved Solids
- Method SM 2340C Hardness, Total
- Method 6010B/7470A Total Metals
- Method 410.4 Chemical Oxygen Demand
- Method SM 2540D Total Suspended Solids
- Method 1664A Oil and Grease
- Method 353.2 Nitrate + Nitrite as Nitrogen
- Method 9040C pH
- Method 350.1 Ammonia
- Method 300.0 Chloride
- Method SM 9222D Fecal Coliforms

Grab samples were collected by dipping containers midway across the stream channel without disturbing the materials on the bottom of the channel. Samples that required preservation with chemical additives were collected using a decontaminated dipper, and then poured into the sample container with the proper chemical preservative.

Sampling was conducted concurrently with discharge measurements to relate water quality with quantity. Channel cross sections were measured with a tape measure and divided into partial sections spaced so that no single section contained more than 10 percent of the total flow. Water depth was measured with a top setting rod and recorded. Velocity measurements were taken at 6/10 the depth with a Marsh McBirney Model 2000 portable flowmeter. The measured velocity was used to calculate the discharge of each cell across the stream channel. The total discharge of the cross section was then calculated as the sum of the discharge of the cells.

All samples and measurements were collected according to procedures set forth in the *MS4 Quarterly Water Quality Sampling Work Plan (Work Plan)* (AECOM 2010b) unless otherwise noted. Results and measurements are discussed in Section 5 of this report.

### 3. SAMPLING EVENTS

Four surface water sampling events occurred in 2010, and are summarized in the following sections.

Each surface water sample was labeled with unique site identification (ID). This site ID was used to identify the site throughout sampling events and to uniquely identify the site in the internal Fort Carson database maintained by AECOM Technical Services. The site ID has two components. Samples collected were identified by a field sample ID that identifies the location and sampling event. This field sample ID has four components. The example below indicates the sample is an MS4 sample collected September 1, 2010, from B-Ditch sample location 2 at surface water station 1.

#### **MS4-Month/Day/Year-Drainage-Sample Location**

**MS4-09/1/10-BD2-SW1**

Drainages are defined in the field sample ID as follows:

BD = B-Ditch  
CD = Clover Ditch  
CUD = Central Unnamed Ditch  
RC = Rock Creek

#### **Q1 Sampling Event**

The MS4 Q1 surface water quality samples were collected on March 25 and 26, 2010. The high, low, and average temperatures for March 25 were 46 degrees Fahrenheit (°F), 26 °F, and 36 °F, respectively. The high, low, and average temperatures for March 26 were 55 °F, 32°F, and 38 °F, respectively. Rain and snow were recorded on the days leading up to the sampling event. Weather stations on and near Fort Carson (station identifications KCOS, MFCRC2, and KCOCOLOR 35) recorded between 0.08 and 0.27 inches of precipitation over the course of March 23 and 24 (Wunderground.com). Weather during the sampling event was sunny and mild, although some snow cover was still present on the ground. Some weather stations in the area recorded precipitation on March 26; however, all sampling was conducted before the precipitation occurred.

Sites visited on March 25 were MS4-CUD3, MS4-CUD2, MS4-CUD1, MS4-CD1, and MS4-CUD4 (listed in order visited). Of these sites, samples and discharge measurements were

collected at MS4-CUD3, MS4-CD1, and MS4-CUD4 (listed in order samples were collected). The remaining sites were dry and not suitable for sampling. Quality control (QC) samples, including the field duplicate, matrix spike, and matrix spike duplicate samples, were collected at MS4-CD1.

Sites visited on March 26 were MS4-RC1, MS4-BD1, MS4-BD2, and MS4-RC2 (listed in order visited). Of these sites, samples and discharge measurements were collected at MS4-BD1, MS4-BD2, and MS4-RC2 (listed in order sample were collected). Sample location MS4-RC1 was dry and not suitable for sampling.

## **Q2 Sampling Event**

The MS4 Q2 surface water quality samples were collected on June 16 and 17, 2010. The high, low, and average temperatures for June 16 were 86 °, 56°F, and 71 °F, respectively. The high, low, and average temperatures for June 17 were 90°F, 62°F, and 73°F, respectively. Measurable rainfall was recorded on June 14 at several weather stations near and on Fort Carson (Wunderground stations KCOCOLOR35 and MFCRC2), and at one site on June 15 (MFCRC2) (Weather Underground Inc., 2010).

Sites visited on June 16 were MS4-RC1, MS4-BD1, MS4-BD2, and MS4-RC2 (listed in order visited). Of these sites, samples and discharge measurements were collected at MS4-RC1, MS4-BD2, and MS4-RC2 (listed in order samples were collected). Site MS4-BD1 was dry and not suitable for sampling. QC samples, including the field duplicate, matrix spike, and matrix spike duplicate samples, were collected at MS4-RC2.

Due to a malfunction of the flow meter at MS4-RC1, the velocity was measured via the float method. A float coefficient was used to interpolate the average stream velocity from the surface velocity measurements taken. A coefficient of 0.85 was used for the center portion of the cross section, and a coefficient of 0.50 was used for the side sections to account for slower flows due to friction caused by the banks. Channel cross sections and water depths were measured and used with the average stream velocity to calculate a discharge rate.

Sites visited on June 17 were MS4-CUD3, MS4-CUD2, MS4-CUD1, and MS4-CD1 (listed in order visited). Of these sites, samples and discharge measurements were collected at MS4-

CUD3 and MS4-CD1 (listed in order sample were collected). Sample locations MS4-CUD2 and MS4-CUD1 were dry and not suitable for sampling.

### **Q3 Sampling Event**

The MS4 Q3 surface water quality samples were collected on September 1 and 2, 2010. The high, low, and average temperatures for September 1 were 86 °F, 51°F, and 66°F, respectively. The high, low, and average temperatures for September 2 were 70°F, 54°F, and 62°F, respectively. No rainfall occurred the week prior to sampling, however between 0.91 – 1.23 inches occurred between August 19 and 25 at the KCOCOLOR 35 and MFCRC2 weather stations (Weather Underground Inc., 2010).

Sites visited on September 1 were MS4-BD1, MS4-BD2, MS4-RC2, and MS4-RC1 (listed in order visited). Of these sites, samples and discharge measurements were collected at MS4-BD2, and MS4-RC2 (listed in order samples were collected). Sites MS4-BD1 and MS4-RC1 were dry and not suitable for sampling. QC samples, including the field duplicate, matrix spike, and matrix spike duplicate samples, were collected at MS4-BD2.

Sites visited on September 2 were MS4-CUD3, MS4-CUD2, MS4-CUD1, MS4-CD1, and MS4-CUD4 (listed in order visited). Of these sites, samples and discharge measurements were collected at MS4-CUD3, MS4-CD1, and MS4-CUD4 (listed in order sample were collected). Sample locations MS4-CUD2 and MS4-CUD1 were dry and not suitable for sampling.

### **Q4 Sampling Event**

The MS4 Q4 surface water quality samples were collected on November 17 and 18, 2010. The high, low, and average temperatures for November 17 were 39 °F, 26°F, and 32°F, respectively. The high, low, and average temperatures for November 18 were 68°F, 26°F, and 52°F, respectively. The last measurable rainfall before the sampling events occurred October 12-14, 2010 (Weather Underground Inc., 2010).

Sites visited on November 17 were MS4-RC1, MS4-BD1, MS4-BD2, MS4-RC2, and MS4-CD1 (listed in order visited). Of these sites, samples and discharge measurements were collected at MS4-BD2, MS4-RC2, and MS4-CD1 (listed in order samples were collected). Sites MS4-RC1 and MS4-BD1 were dry and not suitable for sampling. QC samples, including the field duplicate, matrix spike, and matrix spike duplicate samples, were collected at MS4-CD1.

Sites visited on November 18 were MS4-CUD3, MS4-CUD2, MS4-CUD1, and MS4-CUD4 (listed in order visited). Of these sites, sample and discharge measurements were collected at MS4-CUD4. Construction was taking place approximately 75 – 100 yards upstream of the MS4-CUD4 sample location during the sampling event as seen in Picture #12 of Appendix A. Sample locations MS4-CUD3, MS4-CUD2, and MS4-CUD1 were dry and not suitable for sampling.

## 4. SCREENING CRITERIA

The analytical results were screened against several criteria as determined by the State of Colorado and the U.S. Environmental Protection Agency (EPA). Screening criteria were developed by first examining the water quality standard for Fountain Creek Segment 4. Segment 4 designates tributaries flowing into Fountain Creek near Fort Carson. If standards were not available for a given parameter, then the standards for Fountain Creek, defined as Segment 2a, were used. If this standard did not exist for a given parameter, the CDPHE surface water quality standards for aquatics, agriculture, and drinking water were used. If standards for these uses were available, the lowest value was used for the screening criterion. Finally, if no CDPHE value was available, the EPA Regional Screening Level Master Table was referenced (EPA 2010). If there were no screening criteria from any of these sources, the value was not screened and was simply reported. The decision-making steps are shown on Figure 4-1 (CDPHE 2009, CDPHE 2010, and EPA 2010).

The silver, manganese, and ammonia standards given by the CDPHE are calculated values that are functions of other parameters, such as pH or hardness. As prescribed by CDPHE, for the determination of standards attainment, the sampled hardness value can be used to calculate the associated standard (CDPHE 2009). This was applied in this case to determine the applicable standards for each quarter of sampling. For screening purposes, the lowest calculated standard for the quarter was used to screen the results in these cases.

Method SM 9222D, which detects fecal coliforms, was used to test for pathogens. There is no CDPHE or EPA standard for fecal coliforms. CDPHE does have a Segment 4 standard for *Escherichia coli* (*E. coli*). The *E. coli* bacterium is a type of bacterium within the fecal coliform group. If fecal coliforms were determined to be less than the *E. coli* standard, it can be deduced that the levels of *E. coli* are at a safe level. If fecal coliforms were determined to be greater than the *E. coli* standard, it cannot be conclusively stated the standard is or is not exceeded, as the colonies found within the fecal coliforms could be composed of *E. coli* or could be from *E. coli* and other bacteria.

The published screening criteria for metals use total recoverable or dissolved metals. Dissolved metals are the metals that remain in the sample after it has passed through a 0.45-micron filter. Total metals are the metals contained in the sample after it has undergone an aggressive

digestion where practically all of the metals are brought into solution. This tends to bias a sample high, as some forms of metals are not soluble in nature. Screening criteria for the following metals were developed for total recoverable metals:

Aluminum	Arsenic
Beryllium	Cadmium
Chromium	Copper
Iron	Lead
Nickel	Selenium
Zinc	

Screening criteria for the following metals were developed for dissolved metals:

Antimony	Silver
Thallium	

The difference between a surface water sample's total metals and total recoverable metals is considered negligible. Within a given sample, the total metals concentration could be equal to or greater than the total recoverable metal count. However, concentrations of the total and total recoverable metals would be greater than the dissolved metals concentrations.

The total metals concentrations are related to the total recoverable or dissolved screening criteria as follows:

- If the total metal concentration is less than the dissolved metal screening criterion, the concentration of the dissolved metals in the sample cannot exceed the screening criterion.
- If the total metal concentration is greater than the dissolved metal screening criterion, the exceedance is inconclusive.
- If the total metal concentration is less than the total recoverable screening criterion, the total recoverable metal of the sample cannot exceed the screening criterion.
- If the total metal concentration is greater than the total recoverable screening criterion, the exceedance is inconclusive.

## 5. RESULTS

### Quality Assurance/Quality Control

Samples were analyzed for the analytes as described in the “Introduction and Background” section of this report and in the *Work Plan* (AECOM 2010b). The analytical laboratory data were validated using Level 2 validation, which includes a completeness check, usability assessment, and the method QC assessment. An analytical data package was prepared that includes a compilation of field sample analytical results, the results of laboratory and field QC analyses, and chain-of-custody (COC) documentation. The analytical data package also contains a compilation of the sample delivery groups generated during the investigation. Each sample delivery group contains a case narrative, sample cross-reference list, field sample analytical results, laboratory QC analytical results, a sample receipt form that documents any anomalies found during sample check-in, and copies of the COCs. The data packages from the four sampling events are included on a data disc as part of Appendix B.

### Data Summary

The following section summarizes the sample results in exceedance of the screening criteria from the 2010 MS4 sample results. The exceedances are also shown by location on Figure 5-1. A complete inventory of all sample detections, non-detections, and exceedances is shown in Table 5-1.

The Q1 was the only sample collected at the up gradient B-Ditch site, MS4-BD1. Q2, Q3, and Q4 samples were not collected because of insufficient water. No results from the Q1 event exceeded screening criteria at MS4-BD1.

Four quarterly samples were collected at the down gradient B-Ditch site, MS4-BD2. Sample exceedances at this site are discussed below. Nitrate results from the Q2 (11 milligrams per liter (mg/L)), Q3 (16 mg/L), and Q4 (32 mg/L) events exceeded screening criteria (10 mg/L). Nitrate exceedances as well as the Q1 sample result are shown graphically on Figure 5-2. Selenium results from the Q2 (0.036 value estimated [J] mg/L), Q3 (0.051 J mg/L), and Q4 (0.098 J mg/L) events exceeded screening criteria (0.02 mg/L). Selenium exceedances as well as the Q1 sample result are shown graphically on Figure 5-3. Fecal coliform results from the Q2 (180 J colony forming units per 0.1 liter (cfu/0.1 L)) exceeded screening criteria (126 cfu/0.1 L). The fecal

coliform exceedance as well as the other three sample results are shown graphically on Figure 5-4.

Four quarterly samples were collected at site MS4-CD1. This down gradient site is the only Clover Ditch sample location, as the ditch begins on Post. Sample exceedances at this site are discussed below. The Q4 ammonia result (0.35 mg/L) exceeded the screening criteria (0.074 mg/L). As discussed in Section 4 of this report, the ammonia screening criteria is calculated as a function of pH and water temperature. The pH and water temperature measurement at each site from each event was evaluated individually, and the lowest resulting value was used as screening criteria for that quarter. The site which resulted in the lowest calculated value for the fourth quarter data was MS4-CUD4. It is noteworthy that the calculated value for MS4-CD1 was 0.126 mg/L, and the Q4 ammonia result (0.35 mg/L) exceeded this value as well. The Q4 ammonia exceedance as well as the Q1-Q3 results are shown graphically on Figure 5-5. Additionally at MS4-CD1, nitrate results from Q3 (11 mg/L) and Q4 (11 mg/L) exceeded screening criteria (10 mg/L). Nitrate exceedances as well as the Q1 and Q2 sample results are shown graphically on Figure 5-6. Fecal coliform results from Q2 (130 cfu/0.1 L), Q3 (3500 cfu/0.1 L), and Q4 (220 cfu/0.1 L) exceeded screening criteria (126 cfu/0.1 L). Fecal coliform exceedances as well as the Q1 result are shown graphically on Figure 5-7.

Three samples were collected at the up gradient Central Unnamed Ditch site, MS4-CUD3 through the Q1, Q2, and Q3 events. The site was dry during the Q4 event. The fecal coliform result from Q3 (260 cfu/0.1 L) exceeded screening criteria (126 cfu/0.1 L). Fecal coliform exceedances as well as the Q1 and Q2 results are shown graphically on Figure 5-8.

Four quarterly samples were collected at the down gradient Central Unnamed Ditch site, MS4-CUD4. Sample exceedances at this site are discussed below. The aluminum result from Q4 (0.82 mg/L) exceeded screening criteria (0.75 mg/L). The aluminum exceedance as well as the Q1, Q2, and Q3 results are shown graphically on Figure 5-9. Iron results from Q3 (1.8 mg/L) and Q4 (1.3 mg/L) exceeded screening criteria (1.0 mg/L). The iron exceedances as well as the Q1 and Q2 results are shown graphically on Figure 5-10.

The Q2 sample was the only sample collected at the up gradient Rock Creek site, MS4-RC1; Q1, Q3, and Q4 samples were not collected because of insufficient water. No results from the Q2 event exceeded screening criteria at MS4-RC1.

Four quarterly samples were collected at the down gradient Rock Creek site, MS4-RC2. No results from the sampling events exceeded screening criteria at this site.

As noted above, MS4-BD2, MS4-CD1, and MS4-CUD3 fecal coliform sample results exceeded the screening criteria. There is no CDPHE standard for fecal coliforms, but rather a standard for *E. coli*. This value is used for the screening criteria. In the scenario above when the fecal coliform concentrations are greater than the *E. coli* screening criteria, it cannot be determined whether the amount of *E. coli* present in the sample is greater than the CDPHE standard. This is discussed in Section 4 of this report.

An initial screening criterion for mercury is not available for Segment 4 streams; therefore, the criterion for Segment 2a was used. The analytical method detection limit (MDL) that was used for mercury was designed to meet drinking water standards. The MDL that would be required to meet the aquatic organisms standard is two orders of magnitude below human drinking water standards and was not included in this analysis. All samples were non-detect using drinking water standards but could not be quantified for the standard required in Fountain Creek. The CDPHE and EPA drinking water standards for mercury are both 2.0 micrograms per liter ( $\mu\text{g/L}$ ) as compared to 0.01  $\mu\text{g/L}$  for aquatic organisms (CDPHE 2009 and EPA 2010).

An initial screening criterion for silver is not available for Segment 4 streams; therefore, the criterion for Segment 2a was used. The silver screening criterion is calculated as a function of water hardness, as discussed in Section 4 of this report. The hardness result at each site from each event was evaluated individually, and the lowest resulting value was used as screening criterion for that quarter. The site which resulted in the lowest calculated value for the second quarter data was MS4-RC1. The silver standard calculated from this value was 0.0002 mg/L, and was less than the MDL for the silver analysis (0.00093 mg/L). The silver standard calculated based off the hardness data collected at MS4-CUD4 was 0.0008, and was also less than the MDL (0.00093 mg/L). The calculated value for all other sites for this quarter, as well as all other sites for the other sampling events were greater than the MDL. It should be noted that the silver standard used was the chronic, aquatic life standard. The acute, aquatic life standard for silver, which is a larger value, was above the MDL for all sites during all sampling events. All samples collected were non-detect for silver, at the afore mentioned MDL.

For all other analytes, the MDL was greater than the screening criteria.

Discharge measurements are summarized in Table 5-2. Temperature measurements are summarized in Table 5-3.

## 6. REFERENCES

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## **TABLES**

**TABLE 1-1  
SAMPLE LOCATION COORDINATES**

<b>Site ID</b>	<b>Latitude</b>	<b>Longitude</b>
MS4-BD 1*	38° 45' 53"	104° 48' 20"
MS4-BD 2	38° 45' 10"	104° 45' 46"
MS4-CD 1	38° 43' 07"	104° 43' 45"
MS4-CUD 1	38° 45' 07"	104° 48' 38"
MS4-CUD 2	38° 43' 53"	104° 48' 55"
MS4-CUD 3*	38° 42' 20"	104° 49' 23"
MS4-CUD 4*	38° 40' 46"	104° 43' 12"
MS4-RC 1*	38° 41' 55"	104° 49' 49"
MS4-RC 2	38° 39' 09"	104° 44' 48"

**Notes:**

Site IDs with "\*" indicate location is estimated from aerial photographs. Locations are shown as latitude and longitude in degree, minute, second format. Datum is NAD 83, US feet.

ID = identification

**TABLE 5-1  
CUMULATIVE SUMMARY OF SCREENED ANALYTICAL RESULTS**

Method	Analyte	Units	Screening Criterion				Criterion Reference	MS4-BD1			
			Q1	Q2	Q3	Q4		3/26/2010	6/17/2010	9/1/2010	11/17/2010
								STLAC			
1664A	Oil and Grease	mg/L	--					ND [1.3] (9.4)	DNS	DNS	DNS
2540D	Total Suspended Solids	mg/L	--					2 J	DNS	DNS	DNS
300	Chloride	mg/L	250				B	94	DNS	DNS	DNS
350.1	Ammonia as N	mg/L	3.203	0.116	0.166	0.074	A	0.053 J	DNS	DNS	DNS
353.2	Nitrate as N	mg/L	10				B	0.25 J	DNS	DNS	DNS
410.4	Chemical Oxygen Demand (Regular)	mg/L	--					13 J	DNS	DNS	DNS
6010B	Aluminum (TOT)	mg/L	0.75				C2	0.07 J	DNS	DNS	DNS
6010B	Antimony (TOT)	mg/L	0.0056				C3	ND [0.0031] (0.05)	DNS	DNS	DNS
6010B	Arsenic (TOT)	mg/L	0.1				A	ND [0.0044] (0.03)	DNS	DNS	DNS
6010B	Barium (TOT)	mg/L	2				D	0.046 J	DNS	DNS	DNS
6010B	Beryllium (TOT)	mg/L	0.1				A	ND [0.00047] (0.004)	DNS	DNS	DNS
6010B	Cadmium (TOT)	mg/L	0.01				A	ND [0.00045] (0.005)	DNS	DNS	DNS
6010B	Calcium (TOT)	mg/L	--					76	DNS	DNS	DNS
6010B	Chromium (TOT)	mg/L	0.1				A1	ND [0.00066] (0.01)	DNS	DNS	DNS
6010B	Cobalt (TOT)	mg/L	0.011				D	ND [0.0012] (0.05)	DNS	DNS	DNS
6010B	Copper (TOT)	mg/L	0.2				A	ND [0.0014] (0.01)	DNS	DNS	DNS
6010B	Iron (TOT)	mg/L	1				B	0.082 J	DNS	DNS	DNS
6010B	Lead (TOT)	mg/L	0.1				A	ND [0.0026] (0.025)	DNS	DNS	DNS
6010B	Magnesium (TOT)	mg/L	--					24	DNS	DNS	DNS
6010B	Manganese (TOT)	mg/L	0.2	1.512	2.6	2.6	C4	0.036 Q	DNS	DNS	DNS
6010B	Nickel (TOT)	mg/L	0.2				A	0.0018 JQ	DNS	DNS	DNS
6010B	Potassium (TOT)	mg/L	--					3.7	DNS	DNS	DNS
6010B	Selenium (TOT)	mg/L	0.02				A	ND [0.0049] (0.2)	DNS	DNS	DNS
6010B	Silver (TOT)	mg/L	0.002	2E-04	0.003	0.003	B	ND [0.00093] (0.01)	DNS	DNS	DNS
6010B	Sodium (TOT)	mg/L	--					150	DNS	DNS	DNS
6010B	Thallium (TOT)	mg/L	0.015				C2	ND [0.0049] (0.08)	DNS	DNS	DNS
6010B	Vanadium (TOT)	mg/L	0.18				D	ND [0.0011] (0.01)	DNS	DNS	DNS
6010B	Zinc (TOT)	mg/L	2				A	0.0045 JQ	DNS	DNS	DNS
7470A	Mercury (TOT)	mg/L	0.00001				B	ND [0.000027] (0.0002)	DNS	DNS	DNS
9040	pH	pH units	6.5-9				A	8.1 HF	DNS	DNS	DNS
9222D	Fecal Coliform	CFU/0.1L	126				A2	ND [1] (1)	DNS	DNS	DNS
SM2320B	Alkalinity, Bicarb. as CaCO <sub>3</sub> at pH 4.5	mg/L	--					180	DNS	DNS	DNS
SM2320B	Alkalinity, Carb. as CaCO <sub>3</sub> at pH 8.3	mg/L	--					ND [1.1] (5)	DNS	DNS	DNS
SM2320B	Alkalinity, Total as CaCO <sub>3</sub> at pH 4.5	mg/L	--					180	DNS	DNS	DNS
SM2340C	Hardness as CaCO <sub>3</sub>	mg/L	--					310	DNS	DNS	DNS
SM2510B	Specific conductance	µmhos/cm	--					1300	DNS	DNS	DNS
SM2540C	Total Dissolved Solids	mg/L	--					800	DNS	DNS	DNS

**TABLE 5-1  
CUMULATIVE SUMMARY OF SCREENED ANALYTICAL RESULTS**

Method	Analyte	Units	Screening Criterion				Criterion Reference	MS4-BD2			
			Q1	Q2	Q3	Q4		3/26/2010	6/16/2010	9/1/2010	11/17/2010
								STLAC			
1664A	Oil and Grease	mg/L	--					ND [1.3] (9.4)	ND [1.3] (9.4)	ND [1.3] (10)	1.7 J
2540D	Total Suspended Solids	mg/L	--					18	1.2 J	9.6 J	ND [1.1] (10)
300	Chloride	mg/L	250				B	180	150	180	230
350.1	Ammonia as N	mg/L	3.203	0.116	0.166	0.074	A	0.065 J	ND [0.022] (0.1) (UJ) [M]	ND [0.022](0.1)	ND [0.022](0.1)
353.2	Nitrate as N	mg/L	10				B	4.7	<b>11</b>	<b>16</b>	<b>32</b>
410.4	Chemical Oxygen Demand (Regular)	mg/L	--					18 J	15 J	23	23
6010B	Aluminum (TOT)	mg/L	0.75				C2	0.34	0.033 J	0.042 J	ND [0.018] (0.2)
6010B	Antimony (TOT)	mg/L	0.0056				C3	ND [0.0031] (0.05)	ND [0.0031] (0.05)	ND [0.0031] (0.05)	ND [0.0031] (0.05)
6010B	Arsenic (TOT)	mg/L	0.1				A	ND [0.0044] (0.03)	ND [0.0044] (0.03)	ND [0.0044] (0.03)	ND [0.0044] (0.03)
6010B	Barium (TOT)	mg/L	2				D	0.025 J	0.024 J	0.049 J	ND [0.00058](0.05)
6010B	Beryllium (TOT)	mg/L	0.1				A	ND [0.00047] (0.004)	ND [0.00047] (0.004)	ND [0.00047] (0.004)	ND [0.00047] (0.004)
6010B	Cadmium (TOT)	mg/L	0.01				A	0.00048 J	0.00067 J	ND [0.00045] (0.005)	ND [0.00045] (0.005)
6010B	Calcium (TOT)	mg/L	--					140	170	260 J	310
6010B	Chromium (TOT)	mg/L	0.1				A1	0.00077 J	0.00077 JQ	ND [0.00066](0.01)	ND [0.00066](0.01)
6010B	Cobalt (TOT)	mg/L	0.011				D	ND [0.0012] (0.05)	0.00042 J	ND [0.0012] (0.05)	ND [0.0012] (0.05)
6010B	Copper (TOT)	mg/L	0.2				A	ND [0.0014] (0.01)	ND [0.00014](0.01)	0.0039 JQ	ND [0.0014](0.01)
6010B	Iron (TOT)	mg/L	1				B	0.3	0.036 J	0.044 J	ND [0.022](0.2)
6010B	Lead (TOT)	mg/L	0.1				A	ND [0.0026] (0.025)	ND [0.0026] (0.025)	ND [0.0026] (0.025)	ND [0.0026] (0.025)
6010B	Magnesium (TOT)	mg/L	--					82	140	220 J	300
6010B	Manganese (TOT)	mg/L	0.2	1.512	2.6	2.6	C4	0.038 Q	0.01 Q	0.016 Q	0.06 Q
6010B	Nickel (TOT)	mg/L	0.2				A	0.0017 JQ	0.0019 J	0.0018 JQ	0.0029 JQ
6010B	Potassium (TOT)	mg/L	--					6.2	9.4	12	12
6010B	Selenium (TOT)	mg/L	0.02				A	0.0086 J	<b>0.036 J</b>	<b>0.051 J</b>	<b>0.098 J</b>
6010B	Silver (TOT)	mg/L	0.002	2E-04	0.003	0.003	B	ND [0.00093](0.01)	ND [0.00093] (0.01)	ND [0.00093] (0.01) Q	ND [0.00093] (0.01)
6010B	Sodium (TOT)	mg/L	--					520	800	1000	1300
6010B	Thallium (TOT)	mg/L	0.015				C2	ND [0.0049] (0.08)	0.0072 J	ND [0.0049] (0.08)	ND [0.0049] (0.08)
6010B	Vanadium (TOT)	mg/L	0.18				D	ND [0.0011] (0.01)	ND [0.0011] (0.01)	0.0021 JQ	0.0023 JQ
6010B	Zinc (TOT)	mg/L	2				A	0.0096 JQ	ND [0.0045] (0.02) Q	0.006 JQ	ND [0.0045](0.02)
7470A	Mercury (TOT)	mg/L	0.00001				B	ND [0.000027] (0.0002)	ND [0.000027] (0.0002)	ND [0.000027] (0.0002)	ND [0.000027](0.0002)
9040	pH	pH units	6.5-9				A	8.3 HF	8.3	8.2 HF (J) [H]	8.1 HF (J) [H]
9222D	Fecal Coliform	CFU/0.1L	126				A2	ND [1] (1)	75	<b>180 J</b>	8.3
SM2320B	Alkalinity, Bicarb. as CaCO <sub>3</sub> at pH 4.5	mg/L	--					220	320	320	430
SM2320B	Alkalinity, Carb. as CaCO <sub>3</sub> at pH 8.3	mg/L	--					ND [1.1] (5)	ND [1.1] (5.0)	ND [1.1] (5)	ND [1.1] (5)
SM2320B	Alkalinity, Total as CaCO <sub>3</sub> at pH 4.5	mg/L	--					220	320	320	430
SM2340C	Hardness as CaCO <sub>3</sub>	mg/L	--					740	1200	1800	2100
SM2510B	Specific conductance	µmhos/cm	--					3300	4600	5700	7400
SM2540C	Total Dissolved Solids		--					2300	3700 (J) [Q]	4800 (J) [Q]	590

**TABLE 5-1  
CUMULATIVE SUMMARY OF SCREENED ANALYTICAL RESULTS**

Method	Analyte	Units	Screening Criterion				Criterion Reference	MS4-CD1			
			Q1	Q2	Q3	Q4		3/25/2010	6/17/2010	9/2/2010	11/17/2010
								STLAC			
1664A	Oil and Grease	mg/L	--					ND [1.3] (9.4)	4.5 J (UJ) [M]	ND [1.3] (10)	ND [1.3] (9.4)
2540D	Total Suspended Solids	mg/L	--					28	9.6 J	6.4 J	16
300	Chloride	mg/L	250				B	98	86	92	97
350.1	Ammonia as N	mg/L	3.203	0.116	0.166	0.074	A	0.063 J (J) [M]	ND [0.022] (0.1) (UJ) [M]	0.044 J (J) [M]	0.35 QJ (J) [L, M]
353.2	Nitrate as N	mg/L	10				B	3.4	6.2	<b>11</b>	<b>11</b>
410.4	Chemical Oxygen Demand (Regular)	mg/L	--					18 J	15 J	ND [4.1](20)	23
6010B	Aluminum (TOT)	mg/L	0.75				C2	0.74 J (J) [M]	0.26	0.15 J	0.65
6010B	Antimony (TOT)	mg/L	0.0056				C3	ND [0.0031] (0.05)	ND [0.0031] (0.05)	ND [0.0031] (0.05)	ND [0.0031] (0.05)
6010B	Arsenic (TOT)	mg/L	0.1				A	ND [0.0044] (0.03)	ND [0.0044] (0.03)	ND [0.0044] (0.03)	ND [0.0044] (0.03)
6010B	Barium (TOT)	mg/L	2				D	0.025 J	0.026 J	0.03 J	ND [0.00058](0.05)
6010B	Beryllium (TOT)	mg/L	0.1				A	ND [0.00047] (0.004)	ND [0.00047] (0.004)	ND [0.00047] (0.004)	ND [0.00047] (0.004)
6010B	Cadmium (TOT)	mg/L	0.01				A	ND [0.00045] (0.005)	0.00047 J	ND [0.00045] (0.005)	ND [0.00045] (0.005)
6010B	Calcium (TOT)	mg/L	--					67	90	110	110
6010B	Chromium (TOT)	mg/L	0.1				A1	0.0016 J	0.00076 JQ	0.0011 JQ	ND [0.00066](0.01)
6010B	Cobalt (TOT)	mg/L	0.011				D	ND [0.0012] (0.05)	0.00026 J	ND [0.0012] (0.05)	ND [0.0012] (0.05)
6010B	Copper (TOT)	mg/L	0.2				A	0.0026 JQ	ND [0.00014](0.01)	0.0036 JQ	ND [0.0014](0.01)
6010B	Iron (TOT)	mg/L	1				B	0.84	0.3	0.19 J	0.64
6010B	Lead (TOT)	mg/L	0.1				A	0.0038 J	ND [0.0026] (0.025)	ND [0.0026] (0.025)	ND [0.0026] (0.025)
6010B	Magnesium (TOT)	mg/L	--					28	41	51	52
6010B	Manganese (TOT)	mg/L	0.2	1.512	2.6	2.6	C4	0.051 Q	0.018 Q	0.015 Q	0.023 Q
6010B	Nickel (TOT)	mg/L	0.2				A	0.0029 JQ	0.0022 J	0.0025 J	0.0025 JQ
6010B	Potassium (TOT)	mg/L	--					8.6	8.7	8.2	9.9
6010B	Selenium (TOT)	mg/L	0.02				A	ND [0.0049] (0.2)	0.0081 J	0.0072 J	ND [0.0049] (0.2)
6010B	Silver (TOT)	mg/L	0.002	2E-04	0.003	0.003	B	ND [0.00093] (0.01)	ND [0.00093] (0.01)	ND [0.00093] (0.01)	ND [0.00093] (0.01)
6010B	Sodium (TOT)	mg/L	--					160	210	230	230
6010B	Thallium (TOT)	mg/L	0.015				C2	ND [0.0049] (0.08)	ND [0.0049] (0.08)	ND [0.0049] (0.08)	ND [0.0049] (0.08)
6010B	Vanadium (TOT)	mg/L	0.18				D	0.0028 JQ	0.0016 J	0.0016 J	0.0031 JQ
6010B	Zinc (TOT)	mg/L	2				A	0.037 Q	0.023 Q	0.023	0.042 Q
7470A	Mercury (TOT)	mg/L	0.00001				B	ND [0.000027] (0.0002)	ND [0.000027](0.0002)	ND [0.000027] (0.0002)	ND [0.000027](0.0002)
9040	pH	pH units	6.5-9				A	8.2	8.4	8.6 HF (J) [H]	8.1 HF (J) [H]
9222D	Fecal Coliform	CFU/0.1L	126				A2	28 J	<b>130</b>	<b>3500</b>	<b>220</b>
SM2320B	Alkalinity, Bicarb. as CaCO <sub>3</sub> at pH 4.5	mg/L	--					150	160	170	180
SM2320B	Alkalinity, Carb. as CaCO <sub>3</sub> at pH 8.3	mg/L	--					ND [1.1] (5)	6.8	4.3 J	ND [1.1] (5)
SM2320B	Alkalinity, Total as CaCO <sub>3</sub> at pH 4.5	mg/L	--					150	170	180	180
SM2340C	Hardness as CaCO <sub>3</sub>	mg/L	--					290	470	520	490
SM2510B	Specific conductance	µmhos/cm	--					1300	1600	1800	1800
SM2540C	Total Dissolved Solids		--					800	1100 (J) [Q]	1300	1200

**TABLE 5-1  
CUMULATIVE SUMMARY OF SCREENED ANALYTICAL RESULTS**

Method	Analyte	Units	Screening Criterion					MS4-CUD3			
			Q1	Q2	Q3	Q4	Criterion Reference	3/25/2010	6/17/2010	9/2/2010	11/17/2010
								STLAC			
1664A	Oil and Grease	mg/L	--					ND [1.3] (9.4)	3.4 J (UJ) [M]	ND [1.3] (9.5)	DNS
2540D	Total Suspended Solids	mg/L	--					1.6 J	1.6 J	15	DNS
300	Chloride	mg/L	250				B	16	16	20	DNS
350.1	Ammonia as N	mg/L	3.203	0.116	0.166	0.074	A	ND [0.022] (0.1) (UJ) [M]	ND [0.022] (0.1) (UJ) [M]	0.026 J (J) [M]	DNS
353.2	Nitrate as N	mg/L	10				B	0.028 J	ND [0.019] (1)	ND [0.019] (1)	DNS
410.4	Chemical Oxygen Demand (Regular)	mg/L	--					8 J	4.2 J	ND [4.1](20)	DNS
6010B	Aluminum (TOT)	mg/L	0.75				C2	ND [0.018] (0.2)	0.042 J	0.21	DNS
6010B	Antimony (TOT)	mg/L	0.0056				C3	ND [0.0031] (0.05)	ND [0.0031] (0.05)	ND [0.0031] (0.05)	DNS
6010B	Arsenic (TOT)	mg/L	0.1				A	ND [0.0044] (0.03)	ND [0.0044] (0.03)	ND [0.0044] (0.03)	DNS
6010B	Barium (TOT)	mg/L	2				D	0.04 J	0.045 J	0.06	DNS
6010B	Beryllium (TOT)	mg/L	0.1				A	ND [0.00047] (0.004)	ND [0.00047] (0.004)	ND [0.00047] (0.004)	DNS
6010B	Cadmium (TOT)	mg/L	0.01				A	ND [0.00045] (0.005)	ND [0.00045] (0.005)	ND [0.00045] (0.005)	DNS
6010B	Calcium (TOT)	mg/L	--					67	67	92	DNS
6010B	Chromium (TOT)	mg/L	0.1				A1	ND [0.00066] (0.01)	ND [0.00066] (0.01) Q	0.0012 JQ	DNS
6010B	Cobalt (TOT)	mg/L	0.011				D	ND [0.0012] (0.05)	ND [0.00012] (0.05)	ND [0.0012] (0.05)	DNS
6010B	Copper (TOT)	mg/L	0.2				A	ND [0.0014] (0.01)	ND [0.00014] (0.01)	ND [0.0014] (0.01) Q	DNS
6010B	Iron (TOT)	mg/L	1				B	ND [0.022] (0.2)	0.065 J	0.24	DNS
6010B	Lead (TOT)	mg/L	0.1				A	ND [0.0026] (0.025)	ND [0.0026] (0.025)	ND [0.0026] (0.025)	DNS
6010B	Magnesium (TOT)	mg/L	--					29	30	46	DNS
6010B	Manganese (TOT)	mg/L	0.2	1.512	2.6	2.6	C4	0.0011 JQ	0.0022 JQ	0.0024 JQ	DNS
6010B	Nickel (TOT)	mg/L	0.2				A	ND [0.0013] (0.02)	ND [0.0013] (0.02)	ND [0.0013] (0.02)	DNS
6010B	Potassium (TOT)	mg/L	--					2.4 J	2.6 J	3.1	DNS
6010B	Selenium (TOT)	mg/L	0.02				A	ND [0.0049] (0.2)	ND [0.0049] (0.2)	0.0054 J	DNS
6010B	Silver (TOT)	mg/L	0.002	2E-04	0.003	0.003	B	ND [0.00093] (0.01)	ND [0.00093] (0.01)	ND [0.00093] (0.01)	DNS
6010B	Sodium (TOT)	mg/L	--					65	66	84	DNS
6010B	Thallium (TOT)	mg/L	0.015				C2	ND [0.0049] (0.08)	ND [0.0049] (0.08)	ND [0.0049] (0.08)	DNS
6010B	Vanadium (TOT)	mg/L	0.18				D	ND [0.0011] (0.01)	ND [0.0011] (0.01)	ND [0.0011] (0.01)	DNS
6010B	Zinc (TOT)	mg/L	2				A	ND [0.0045] (0.02)	ND [0.0045] (0.02) Q	ND [0.0045] (0.02)	DNS
7470A	Mercury (TOT)	mg/L	0.00001				B	ND [0.000027] (0.0002)	ND [0.000027] (0.0002)	ND [0.000027] (0.0002)	DNS
9040	pH	pH units	6.5-9				A	8.3	8.2	8.4 HF (J) [H]	DNS
9222D	Fecal Coliform	CFU/0.1L	126				A2	ND [1] (1)	1.8	<b>260</b>	DNS
SM2320B	Alkalinity, Bicarb. as CaCO <sub>3</sub> at pH 4.5	mg/L	--					290	300	380	DNS
SM2320B	Alkalinity, Carb. as CaCO <sub>3</sub> at pH 8.3	mg/L	--					ND [1.1] (5)	4.7 J	ND [1.1] (5)	DNS
SM2320B	Alkalinity, Total as CaCO <sub>3</sub> at pH 4.5	mg/L	--					290	300	380	DNS
SM2340C	Hardness as CaCO <sub>3</sub>	mg/L	--					290	330	460	DNS
SM2510B	Specific conductance	µmhos/cm	--					770	800	1000	DNS
SM2540C	Total Dissolved Solids		--					460	510 (J) [Q]	670	DNS

**TABLE 5-1  
CUMULATIVE SUMMARY OF SCREENED ANALYTICAL RESULTS**

Method	Analyte	Units	Screening Criterion					MS4-CUD4			
			Q1	Q2	Q3	Q4	Criterion Reference	3/25/2010	6/17/2010	9/2/2010	11/18/2010
								STLAC			
1664A	Oil and Grease	mg/L	--					ND [1.3] (9.4)	3.8 J (UJ) [M]	ND [1.4] (10)	1.9 J
2540D	Total Suspended Solids	mg/L	--					3.6 J	28	4 J	20
300	Chloride	mg/L	250					140	160	150	180
350.1	Ammonia as N	mg/L	3.203	0.116	0.166	0.074	A	ND [0.022] (0.1) (UJ) [M]	ND [0.022] (0.1) J (UJ) [M]	0.03 J (J) [M]	ND [0.022](0.1)
353.2	Nitrate as N	mg/L	10					0.023 J	ND [0.019] (1)	0.021 J	0.74 J
410.4	Chemical Oxygen Demand (Regular)	mg/L	--					16 J	22	ND [4.1](20)	21
6010B	Aluminum (TOT)	mg/L	0.75					ND [0.018] (0.2)	0.019 J	0.35	<b>0.82</b>
6010B	Antimony (TOT)	mg/L	0.0056					ND [0.0031] (0.05)	ND [0.0031] (0.05)	ND [0.0031] (0.05)	ND [0.0031] (0.05)
6010B	Arsenic (TOT)	mg/L	0.1					ND [0.0044] (0.03)	ND [0.0044] (0.03)	ND [0.0044] (0.03)	ND [0.0044] (0.03)
6010B	Barium (TOT)	mg/L	2					0.019 J	0.025 J	0.037 J	ND [0.00058](0.05)
6010B	Beryllium (TOT)	mg/L	0.1					ND [0.00047] (0.004)	ND [0.00047] (0.004)	ND [0.00047] (0.004)	ND [0.00047] (0.004)
6010B	Cadmium (TOT)	mg/L	0.01					0.00061 J	0.0007 J	0.00051 J	ND [0.00045] (0.005)
6010B	Calcium (TOT)	mg/L	--					230	240	250 J	260
6010B	Chromium (TOT)	mg/L	0.1					ND [0.00066] (0.01)	ND [0.00066] (0.01) Q	0.0013 JQ	0.00097 J
6010B	Cobalt (TOT)	mg/L	0.011					ND [0.0012] (0.05)	0.00018 J	<b>0.0015 J</b>	0.0025 J
6010B	Copper (TOT)	mg/L	0.2					0.0016 JQ	ND [0.00014](0.01)	0.0017 JQ	ND [0.00014](0.01)
6010B	Iron (TOT)	mg/L	1					0.15 J	0.54	<b>1.8</b>	<b>1.3</b>
6010B	Lead (TOT)	mg/L	0.1					ND [0.0026] (0.025)	ND [0.0026] (0.025)	ND [0.0026] (0.025)	ND [0.0026] (0.025)
6010B	Magnesium (TOT)	mg/L	--					200	230	230	250
6010B	Manganese (TOT)	mg/L	0.2	1.512	2.6	2.6	C4	0.061 Q	0.25 Q	0.7 Q	1.2 Q
6010B	Nickel (TOT)	mg/L	0.2					0.0027 JQ	0.0023 J	0.0032 J	0.0034 JQ
6010B	Potassium (TOT)	mg/L	--					5.5	4.9	6.1	10
6010B	Selenium (TOT)	mg/L	0.02					0.0057 J	ND [0.0049] (0.2)	ND [0.0049] (0.2)	ND [0.0049] (0.2)
6010B	Silver (TOT)	mg/L	0.002	2E-04	0.003	0.003	B	ND [0.00093] (0.01)	ND [0.00093] (0.01)	ND [0.00093] (0.01)	ND [0.00093] (0.01)
6010B	Sodium (TOT)	mg/L	--					700	900	840 J	850
6010B	Thallium (TOT)	mg/L	0.015					ND [0.0049] (0.08)	ND [0.0049] (0.08)	ND [0.0049] (0.08)	ND [0.0049] (0.08)
6010B	Vanadium (TOT)	mg/L	0.18					0.0015 JQ	ND [0.0011] (0.01)	0.0023 J	0.0046 JQ
6010B	Zinc (TOT)	mg/L	2					ND [0.0045] (0.02)	ND [0.0045] (0.02) Q	ND [0.0045] (0.02)	ND [0.0045](0.02)
7470A	Mercury (TOT)	mg/L	0.00001					ND [0.000027] (0.0002)	ND [0.000027] (0.0002)	ND [0.000027] (0.0002)	ND [0.000027] (0.0002)
9040	pH	pH units	6.5-9					8.4	7.9	7.9 HF (J) [H]	7.9 HF (J) [H]
9222D	Fecal Coliform	CFU/0.1L	126					3	69	60	51
SM2320B	Alkalinity, Bicarb. as CaCO <sub>3</sub> at pH 4.5	mg/L	--					340	400	420	460
SM2320B	Alkalinity, Carb. as CaCO <sub>3</sub> at pH 8.3	mg/L	--					ND [1.1] (5)	ND [1.1] (5.0)	ND [1.1] (5)	ND [1.1] (5)
SM2320B	Alkalinity, Total as CaCO <sub>3</sub> at pH 4.5	mg/L	--					340	400	420	460
SM2340C	Hardness as CaCO <sub>3</sub>	mg/L	--					1400	170	1700	1800
SM2510B	Specific conductance	µmhos/cm	--					4700	5500	5100	5600
SM2540C	Total Dissolved Solids		--					3900	4700 (J) [Q]	4300 (J) [Q]	4600

**TABLE 5-1  
CUMULATIVE SUMMARY OF SCREENED ANALYTICAL RESULTS**

Method	Analyte	Units	Screening Criterion				Criterion Reference	MS4-RC1			
			Q1	Q2	Q3	Q4		3/26/2010	6/16/2010	9/1/2010	11/17/2010
								STLAC			
1664A	Oil and Grease	mg/L	--					DNS	ND [1.3] (9.5) (UJ) [M]	DNS	DNS
2540D	Total Suspended Solids	mg/L	--					DNS	ND [1.1] (10)	DNS	DNS
300	Chloride	mg/L	250				B	DNS	9.3	DNS	DNS
350.1	Ammonia as N	mg/L	3.203	0.116	0.166	0.074	A	DNS	0.033 J (J) [M]	DNS	DNS
353.2	Nitrate as N	mg/L	10				B	DNS	ND [0.019] (1)	DNS	DNS
410.4	Chemical Oxygen Demand (Regular)	mg/L	--					DNS	4.8 J	DNS	DNS
6010B	Aluminum (TOT)	mg/L	0.75				C2	DNS	0.043 J	DNS	DNS
6010B	Antimony (TOT)	mg/L	0.0056				C3	DNS	ND [0.0031] (0.05)	DNS	DNS
6010B	Arsenic (TOT)	mg/L	0.1				A	DNS	ND [0.0044] (0.03)	DNS	DNS
6010B	Barium (TOT)	mg/L	2				D	DNS	0.061	DNS	DNS
6010B	Beryllium (TOT)	mg/L	0.1				A	DNS	ND [0.00047] (0.004)	DNS	DNS
6010B	Cadmium (TOT)	mg/L	0.01				A	DNS	ND [0.00045] (0.005)	DNS	DNS
6010B	Calcium (TOT)	mg/L	--					DNS	19	DNS	DNS
6010B	Chromium (TOT)	mg/L	0.1				A1	DNS	0.001 JQ	DNS	DNS
6010B	Cobalt (TOT)	mg/L	0.011				D	DNS	ND [0.00012] (0.05)	DNS	DNS
6010B	Copper (TOT)	mg/L	0.2				A	DNS	ND [0.00014] (0.01)	DNS	DNS
6010B	Iron (TOT)	mg/L	1				B	DNS	0.061 J	DNS	DNS
6010B	Lead (TOT)	mg/L	0.1				A	DNS	ND [0.0026] (0.025)	DNS	DNS
6010B	Magnesium (TOT)	mg/L	--					DNS	5.2	DNS	DNS
6010B	Manganese (TOT)	mg/L	0.2	1.512	2.6	2.6	C4	DNS	0.0021 JQ	DNS	DNS
6010B	Nickel (TOT)	mg/L	0.2				A	DNS	ND [0.0013] (0.02)	DNS	DNS
6010B	Potassium (TOT)	mg/L	--					DNS	2 J	DNS	DNS
6010B	Selenium (TOT)	mg/L	0.02				A	DNS	ND [0.0049] (0.2)	DNS	DNS
6010B	Silver (TOT)	mg/L	0.002	2E-04	0.003	0.003	B	DNS	ND [0.00093] (0.01)	DNS	DNS
6010B	Sodium (TOT)	mg/L	--					DNS	8.5	DNS	DNS
6010B	Thallium (TOT)	mg/L	0.015				C2	DNS	ND [0.0049] (0.08)	DNS	DNS
6010B	Vanadium (TOT)	mg/L	0.18				D	DNS	ND [0.0011] (0.01)	DNS	DNS
6010B	Zinc (TOT)	mg/L	2				A	DNS	ND [0.0045] (0.02) Q	DNS	DNS
7470A	Mercury (TOT)	mg/L	0.00001				B	DNS	ND [0.000027] (0.0002)	DNS	DNS
9040	pH	pH units	6.5-9				A	DNS	7.5	DNS	DNS
9222D	Fecal Coliform	CFU/0.1L	126				A2	DNS	ND [10] (10)	DNS	DNS
SM2320B	Alkalinity, Bicarb. as CaCO <sub>3</sub> at pH 4.5	mg/L	--					DNS	63	DNS	DNS
SM2320B	Alkalinity, Carb. as CaCO <sub>3</sub> at pH 8.3	mg/L	--					DNS	ND [1.1] (5.0)	DNS	DNS
SM2320B	Alkalinity, Total as CaCO <sub>3</sub> at pH 4.5	mg/L	--					DNS	63	DNS	DNS
SM2340C	Hardness as CaCO <sub>3</sub>	mg/L	--					DNS	77	DNS	DNS
SM2510B	Specific conductance	µmhos/cm	--					DNS	190	DNS	DNS
SM2540C	Total Dissolved Solids		--					DNS	110 (J) [Q]	DNS	DNS

**TABLE 5-1  
CUMULATIVE SUMMARY OF SCREENED ANALYTICAL RESULTS**

Method	Analyte	Units	Screening Criterion					MS4-RC2			
			Q1	Q2	Q3	Q4	Criterion Reference	3/26/2010	6/16/2010	9/1/2010	11/17/2010
								STLAC			
1664A	Oil and Grease	mg/L	--					ND [1.3] (9.8)	ND [1.3] (10)	ND [1.3] (9.6)	2 J
2540D	Total Suspended Solids	mg/L	--					4.8 J	2.8 J	8.8 J	1.6 J
300	Chloride	mg/L	250					31	32	35	34
350.1	Ammonia as N	mg/L	3.203	0.116	0.166	0.074	A	0.061 J	ND [0.022] (0.1) J (UJ) [M]	ND [0.022](0.1)	ND [0.022](0.1)
353.2	Nitrate as N	mg/L	10					ND [0.019] (1)	ND [0.019] (1)	ND [0.019] (1)	ND [0.019] (1)
410.4	Chemical Oxygen Demand (Regular)	mg/L	--					ND [4.1] (20)	7.8 J	9.9 J	ND [4.1](20)
6010B	Aluminum (TOT)	mg/L	0.75					0.067 J	0.09 J	0.11 J	ND [0.018](0.2)
6010B	Antimony (TOT)	mg/L	0.0056					0.0036 J	ND [0.0031] (0.05)	ND [0.0031] (0.05)	ND [0.0031] (0.05)
6010B	Arsenic (TOT)	mg/L	0.1					ND [0.0044] (0.03)	ND [0.0044] (0.03)	ND [0.0044] (0.03)	ND [0.0044] (0.03)
6010B	Barium (TOT)	mg/L	2					0.035 J	0.034 J	0.034 J	ND [0.00058](0.05)
6010B	Beryllium (TOT)	mg/L	0.1					ND [0.00047] (0.004)	ND [0.00047] (0.004)	ND [0.00047] (0.004)	ND [0.00047] (0.004)
6010B	Cadmium (TOT)	mg/L	0.01					ND [0.00045] (0.005)	ND [0.00045] (0.005)	ND [0.00045] (0.005)	ND [0.00045] (0.005)
6010B	Calcium (TOT)	mg/L	--					100	89	95	88
6010B	Chromium (TOT)	mg/L	0.1					ND [0.00066] (0.01)	ND [0.00066] (0.01) Q	ND [0.00066](0.01)	0.00078 J
6010B	Cobalt (TOT)	mg/L	0.011					ND [0.0012] (0.05)	ND [0.00012] (0.05)	ND [0.0012] (0.05)	ND [0.0012] (0.05)
6010B	Copper (TOT)	mg/L	0.2					ND [0.0014] (0.01)	ND [0.00014](0.01)	0.0018 JQ	ND [0.0014](0.01)
6010B	Iron (TOT)	mg/L	1					0.07 J	0.095 J	0.16 J	ND [0.022](0.2)
6010B	Lead (TOT)	mg/L	0.1					ND [0.0026](0.025)	ND [0.0026] (0.025)	ND [0.0026] (0.025)	ND [0.0026] (0.025)
6010B	Magnesium (TOT)	mg/L	--					33	31	34	34
6010B	Manganese (TOT)	mg/L	0.2	1.512	2.6	2.6	C4	0.0071 JQ	0.0044 JQ	0.014 Q	ND [0.00025](0.01)
6010B	Nickel (TOT)	mg/L	0.2					ND [0.0013] (0.02)	ND [0.0013] (0.02)	ND [0.0013] (0.02) Q	ND [0.0013] (0.02) Q
6010B	Potassium (TOT)	mg/L	--					1.8 J	1.7 J	2.2 J	ND [0.24](3)
6010B	Selenium (TOT)	mg/L	0.02					ND [0.0049] (0.2)	ND [0.0049] (0.2)	ND [0.0049] (0.2)	ND [0.0049] (0.2)
6010B	Silver (TOT)	mg/L	0.002	2E-04	0.003	0.003	B	ND [0.00093] (0.01)	ND [0.00093] (0.01)	ND [0.00093] (0.01) Q	ND [0.00093] (0.01)
6010B	Sodium (TOT)	mg/L	--					120	110	110	110
6010B	Thallium (TOT)	mg/L	0.015					ND [0.0049] (0.08)	ND [0.0049] (0.08)	ND [0.0049] (0.08)	ND [0.0049] (0.08)
6010B	Vanadium (TOT)	mg/L	0.18					0.0011 JQ	ND [0.0011] (0.01)	0.0021 JQ	0.0015 JQ
6010B	Zinc (TOT)	mg/L	2					ND [0.0045] (0.02)	ND [0.0045] (0.02) Q	ND [0.0045] (0.02) Q	ND [0.0045] (0.02) Q
7470A	Mercury (TOT)	mg/L	0.00001					ND [0.000027] (0.0002)	ND [0.000027] (0.0002)	ND [0.000027] (0.0002)	ND [0.000027](0.0002)
9040	pH	pH units	6.5-9					8.5 HF	8.5	8.4 HF (J) [H]	8.2 HF (J) [H]
9222D	Fecal Coliform	CFU/0.1L	126					2	44 J	110	2
SM2320B	Alkalinity, Bicarb. as CaCO <sub>3</sub> at pH 4.5	mg/L	--					280	270	300	300
SM2320B	Alkalinity, Carb. as CaCO <sub>3</sub> at pH 8.3	mg/L	--					19	ND [1.1] (5.0)	ND [1.1] (5)	ND [1.1] (5)
SM2320B	Alkalinity, Total as CaCO <sub>3</sub> at pH 4.5	mg/L	--					300	270	300	300
SM2340C	Hardness as CaCO <sub>3</sub>	mg/L	--					410	390	390	390
SM2510B	Specific conductance	µmhos/cm	--					1200	1100	1100	1100
SM2540C	Total Dissolved Solids		--					760	760 (J) [Q]	740 (J) [Q]	720

**TABLE 5-1  
CUMULATIVE SUMMARY OF SCREENED ANALYTICAL RESULTS**

**Notes:**

- (#) Number in parentheses represents reporting limit (RL) for the associated analyte.
- [#] Number in square brackets represents the method detection limit (MDL) for the associated analyte.
- Bicarb. Bicarbonate
- CaCO<sub>3</sub> Calcium Carbonate
- Carb. Carbonate
- CDPHE Colorado Department of Public Health and Environment
- CFU/0.1L colony-forming units/0.1 liter
- DNS did not sample
- EPA Environmental Protection Agency
- FD field duplicate
- mg/L milligrams/liter
- N nitrogen
- ND not detected
- Q# quarter number
- TOT total
- STLAC Severn and Trent Laboratory Analysis Center (now Test America)
- mhos/cm micromhos/centimeter
- not available

**Lab Flags (denoted by codes without parentheses)**

- HF Holding time estimated.
- J Estimated. The analyte was positively identified; the quantitation is an estimation.
- Q One or more quality control criteria failed. Data usability should be carefully assessed by the project team.
- Q Post-digestion spike recovery fell between 40% and 85% due to matrix interference.

**Validation Flag Definitions (denoted by letter codes within parentheses):**

- J Result is an estimate because quality control criteria were not met (validation "J" plus sub-qualifier listed below).
- U The analyte was analyzed for, but was not detected above the method detection limit with up to 50 percent probability of a false negative at the method detection limit.
- UJ The analyte was not detected above the reported method detection limit. However, the reported method detection limit is approximate and may or may not represent the actual limit of detection.

**Qualification Code Definitions [denoted by letter codes within brackets]:**

- B Analyte also detected in associated method or calibration blank; attributed to laboratory contamination. The compound is considered a non-detection either at the RL if detected below the RL or at the reported concentration if detected.
- H Holding time estimated.
- M Matrix spike/matrix spike duplicate recoveries or relative percent difference for target analyte outside control limits.

**Screening Criteria Reference:**

- A CDPHE Fountain Creek Segment 4
- A1 CDPHE Fountain Creek Segment 4 - Standard for Chromium VI
- A2 CDPHE Fountain Creek Segment 4 - Standard for *E. coli*
- B CDPHE Fountain Creek Segment 2a
- C1 CDPHE Basic Standard - Water Supply
- C2 CDPHE Basic Standard - Aquatic Life
- C3 CDPHE Basic Standard - Water and Fish
- C4 CDPHE Basic Standard - Agriculture
- D EPA Regional Screening Level Table - Tap Water

**TABLE 5-2  
CUMULATIVE SUMMARY OF DISCHARGE MEASUREMENTS**

<b>Discharge (cubic feet per second)</b>				
	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>
MS4-BD 1	0.1	dry	dry	dry
MS4-BD 2	0.8	0.1	< 0.1	0.1
MS4-CD 1	2.4	1.8	1.2	0.46
MS4-CUD 1	dry	dry	dry	dry
MS4-CUD 2	dry	dry	dry	dry
MS4-CUD 3	0.1	0.1	< 0.1	dry
MS4-CUD 4	0.6	< 0.1	0.2	0.3
MS4-RC 1	dry	0.1	dry	dry
MS4-RC 2	0.4	0.2	0.1	0.2

**Notes:**

Q# = quarter number

< = less than

Velocity measurements taken with Marsh Mc Birney Model 2000  
Portable Flow Meter, Pine Rental ID 10076

**TABLE 5-3  
CUMULATIVE SUMMARY OF TEMPERATURE MEASUREMENTS**

<b>Water Temperature (°C)</b>				
	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>
MS4-BD 1	nr	dry	dry	dry
MS4-BD 2	nr	22	20	1
MS4-CD 1	nr	18	18	7
MS4-CUD 1	dry	dry	dry	dry
MS4-CUD 2	dry	dry	dry	dry
MS4-CUD 3	nr	10	11	dry
MS4-CUD 4	nr	17	16	0
MS4-RC 1	dry	11	dry	dry
MS4-RC 2	nr	21	16	5

**Notes:**

°C = degree Celsius

Q# = quarter number

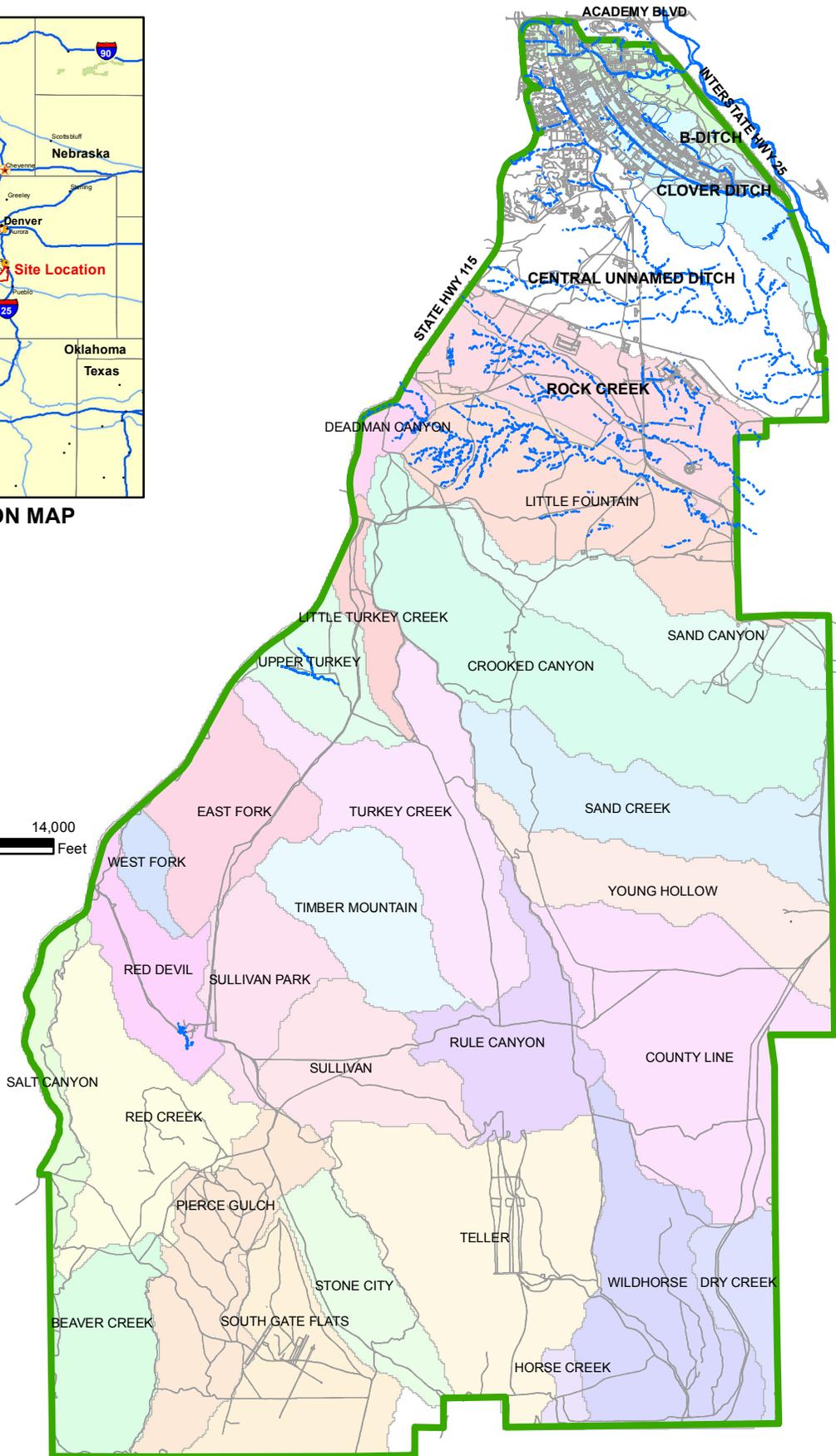
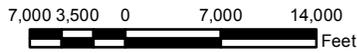
nr = not recorded

Temperature measurements were recorded at the time of sampling with a manual, stream thermometer

## **FIGURES**



**SITE LOCATION MAP**



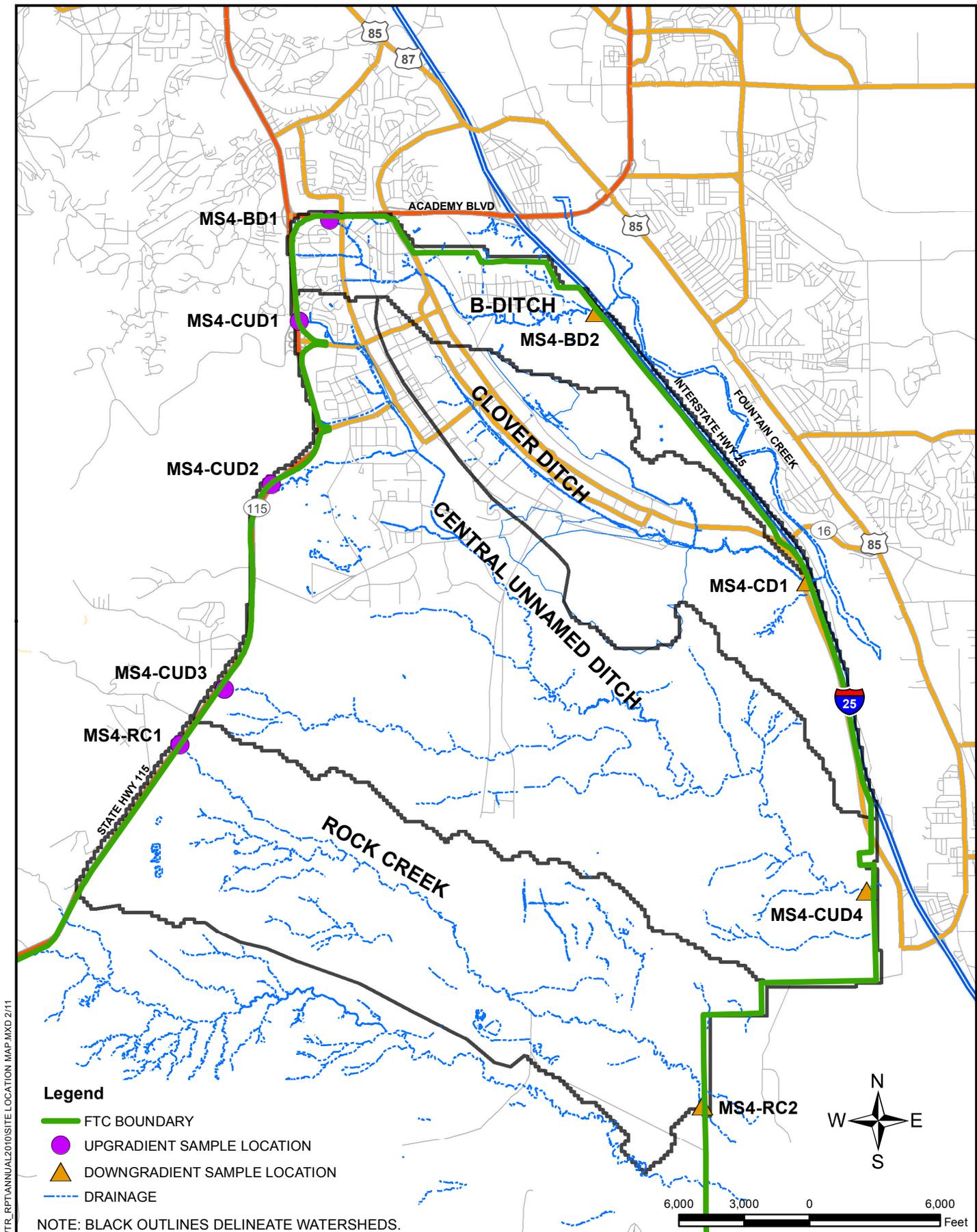
**Legend**

- - - - DRAINAGE
- FTC Boundary

NOTE: SHADED AREAS REPRESENT WATERSHEDS.



**FIGURE 1-1**  
**GENERAL LOCATION MAP**  
 MS4 WATER QUALITY  
 SAMPLING ANNUAL REPORT  
 FORT CARSON, COLORADO



**Legend**

- FTC BOUNDARY
- UPGRADIENT SAMPLE LOCATION
- ▲ DOWNGRADIENT SAMPLE LOCATION
- DRAINAGE

NOTE: BLACK OUTLINES DELINEATE WATERSHEDS.

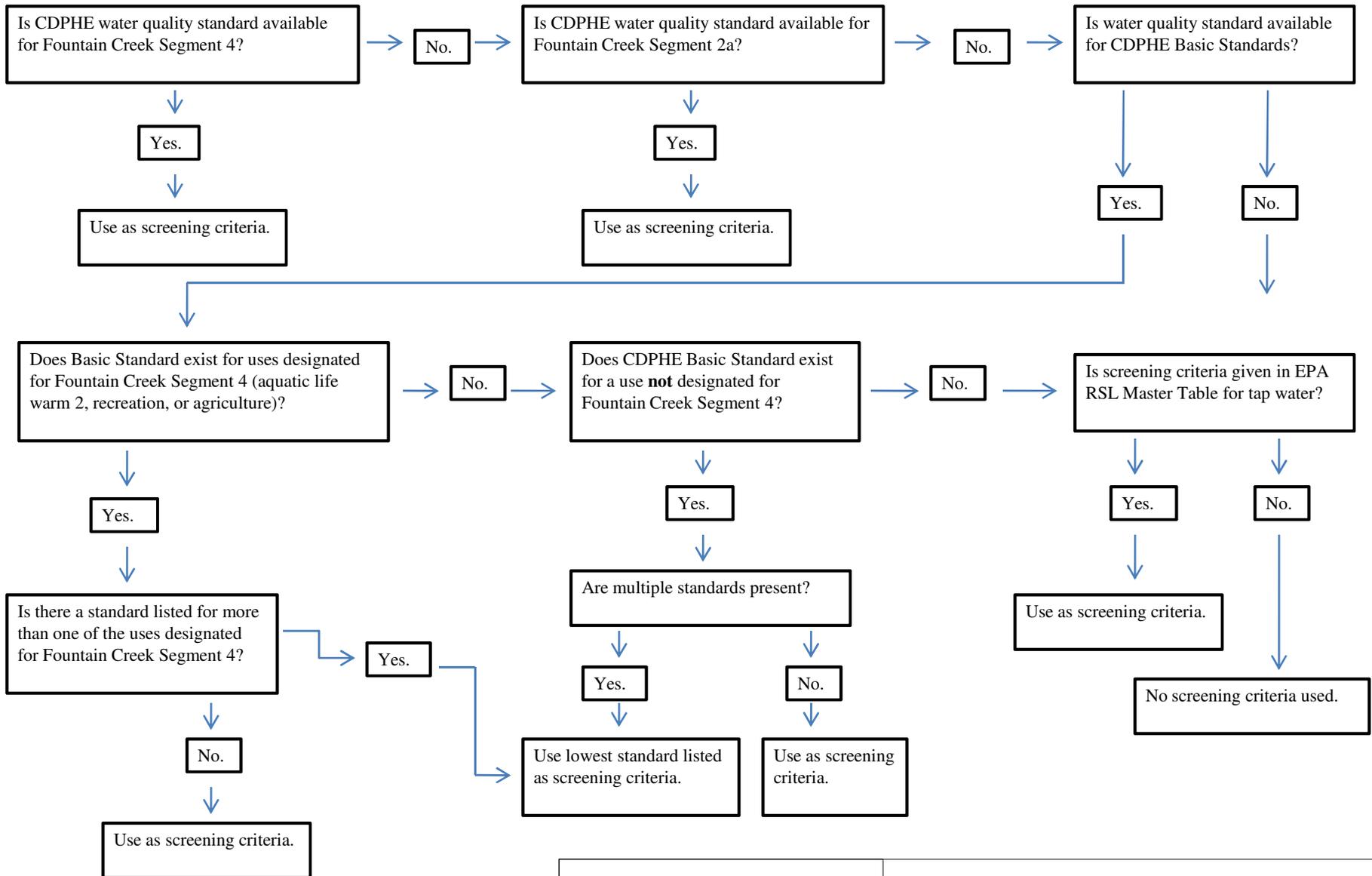
**FIGURE 1-2**

**SAMPLE LOCATION MAP**

MS4 WATER QUALITY  
SAMPLING ANNUAL REPORT  
FORT CARSON, COLORADO



L:\GROUP\CAD\FTC\MS4\_QTR\_WTR\_RPT\ANNUAL2010\SITE LOCATION MAP.MXD 2/11



**Note:**  
 CDPHE – Colorado Department of Public Health and Environment  
 EPA – Environmental Protection Agency  
 RSL – Regional Screening Level



**FIGURE 4-1**  
**SCREENING CRITERIA FLOW CHART**  
 MS4 WATER QUALITY  
 SAMPLING ANNUAL REPORT  
 FORT CARSON, COLORADO

MS4-BD2				
Analyte	Q1	Q2	Q3	Q4
Nitrate as N (mg/L)	4.7	<b>11</b>	<b>16</b>	<b>32</b>
Selenium (mg/L)	0.0086 J	<b>0.036 J</b>	<b>0.051 J</b>	<b>0.098 J</b>
Fecal Coliforms (cfu/0.1L)	ND [1]	75	<b>180 J</b>	8.3

MS4-CD1				
Analyte	Q1	Q2	Q3	Q4
Ammonia as N (mg/L)	0.063 J	ND [0.022]	0.044 J	<b>0.35 J</b>
Nitrate as N (mg/L)	3.4	6.2	<b>11</b>	<b>11</b>
Fecal Coliforms (cfu/0.1L)	28 J	<b>130</b>	<b>3500</b>	<b>220</b>

MS4-BD1				
Q1	Q2	Q3	Q4	
No Exceedances	Dry	Dry	Dry	

MS4-CUD1				
Q1	Q2	Q3	Q4	
Dry				

MS4-CUD2				
Q1	Q2	Q3	Q4	
Dry				

MS4-CUD3				
Analyte	Q1	Q2	Q3	Q4
Fecal Coliforms (cfu/0.1L)	ND [1]	1.8	<b>260</b>	Dry

MS4-RC1				
Q1	Q2	Q3	Q4	
Dry	No Exceedances	Dry	Dry	

MS4-CUD4				
Analyte	Q1	Q2	Q3	Q4
Aluminum (mg/L)	ND [0.018]	0.019 J	0.35	<b>0.82</b>
Iron (mg/L)	0.15 J	0.54	<b>1.8</b>	<b>1.3</b>

MS4-RC2				
Q1	Q2	Q3	Q4	
No Exceedances				

**Legend**

- FTC BOUNDARY
- UPGRADIENT SAMPLE LOCATION
- ▲ DOWNGRADIENT SAMPLE LOCATION
- DRAINAGE

**NOTES:**

cfu/0.1 L - colony forming units per 0.1 liter  
 J - value estimated  
 Q# - Quarter number  
 N - Nitrogen  
 ND [#] - non-detect [method detection limit]  
 mg/L - milligrams per liter  
 \* As discussed in Section 4, the ammonia standard is calculated quarterly using sampled hardness data for the purpose of standard attainment.

**Bold and greyed cells indicate results in exceedance of screening criteria.**

Screening Criteria				
Analyte	Unit	Q1	Q2	Q3   Q4
Aluminum	mg/L		0.75	
Ammonia*	mg/L	3.203	0.116	0.166   0.074
Fecal Coliform	cfu/0.1L		126	
Iron	mg/L		1	
Nitrate	mg/L		10	
Selenium	mg/L		0.02	

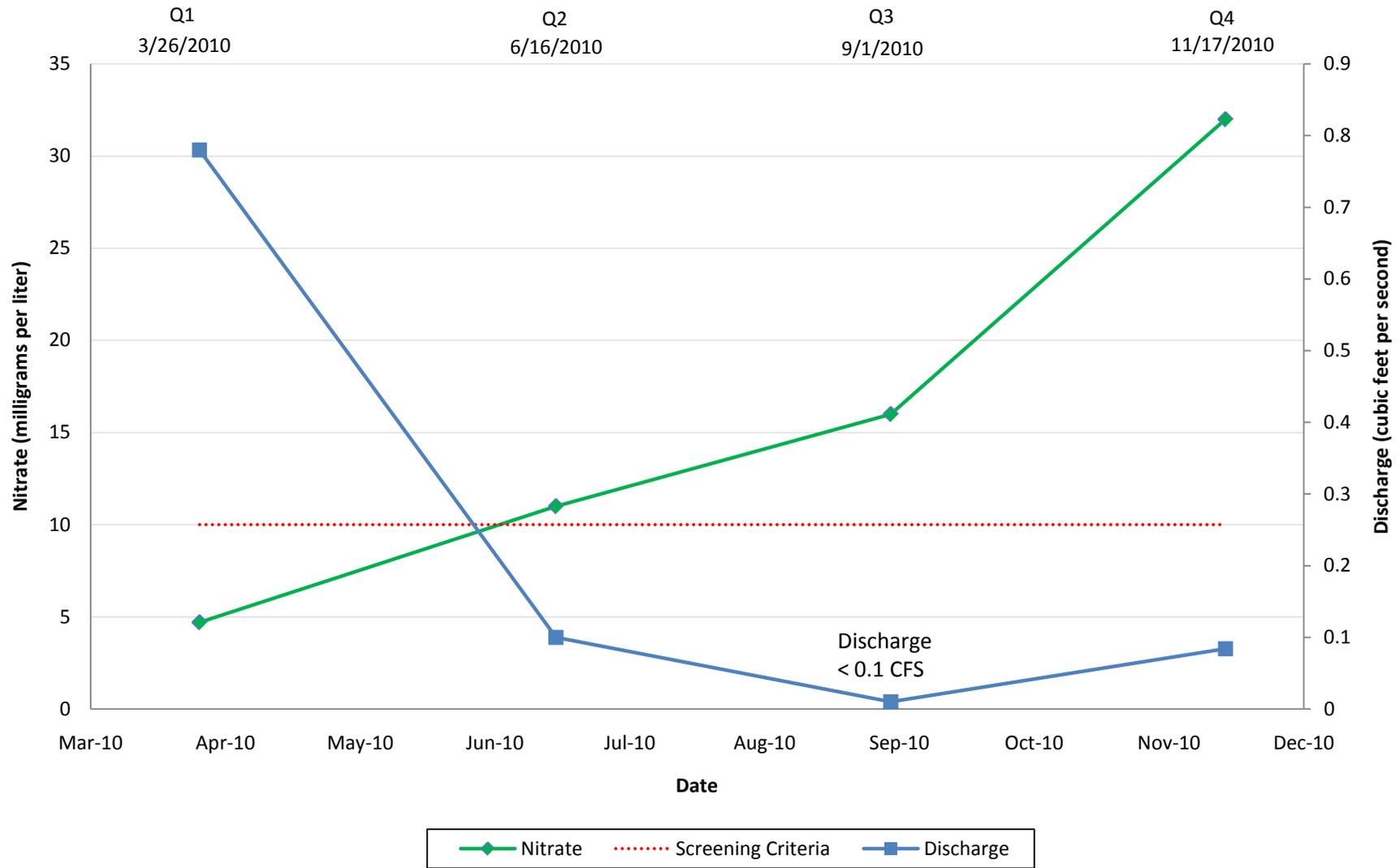
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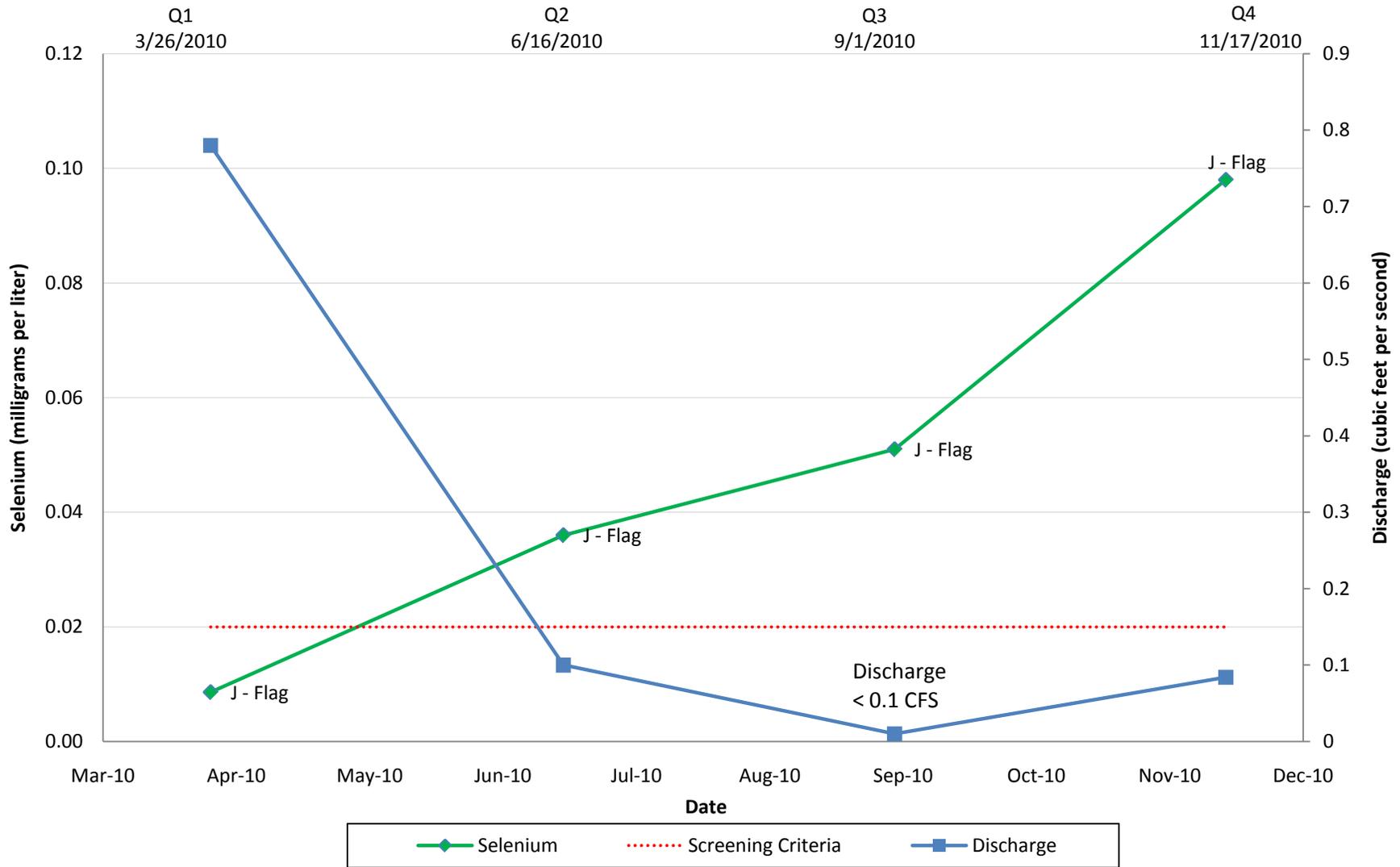
**FIGURE 5-1**  
**EXCEEDANCES MAP**  
 MS4 WATER QUALITY  
 SAMPLING ANNUAL REPORT  
 FORT CARSON, COLORADO



**Figure 5-2**  
**MS4-BD2 Nitrate Results**

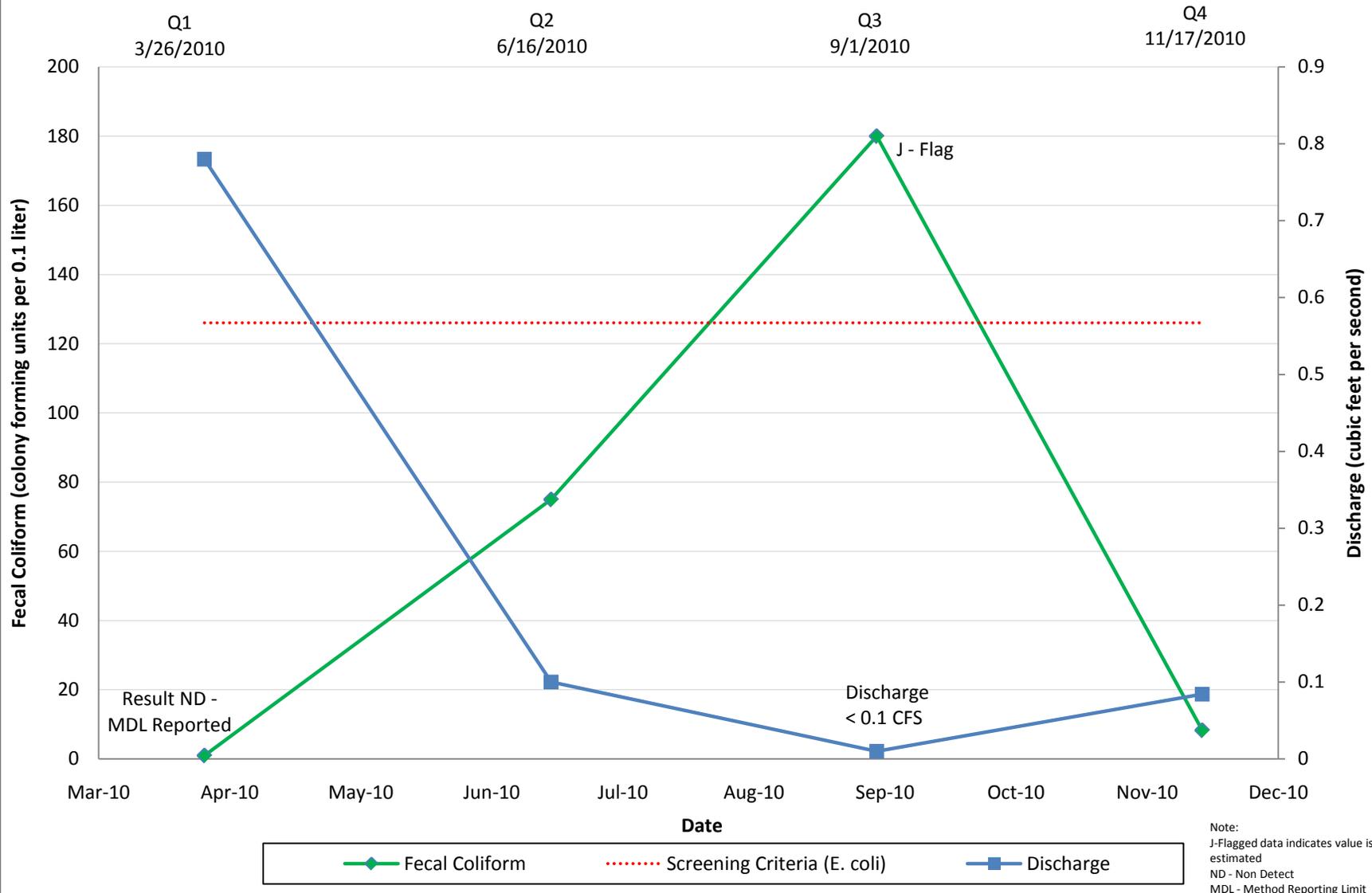


### Figure 5-3 MS4-BD2 Selenium Results

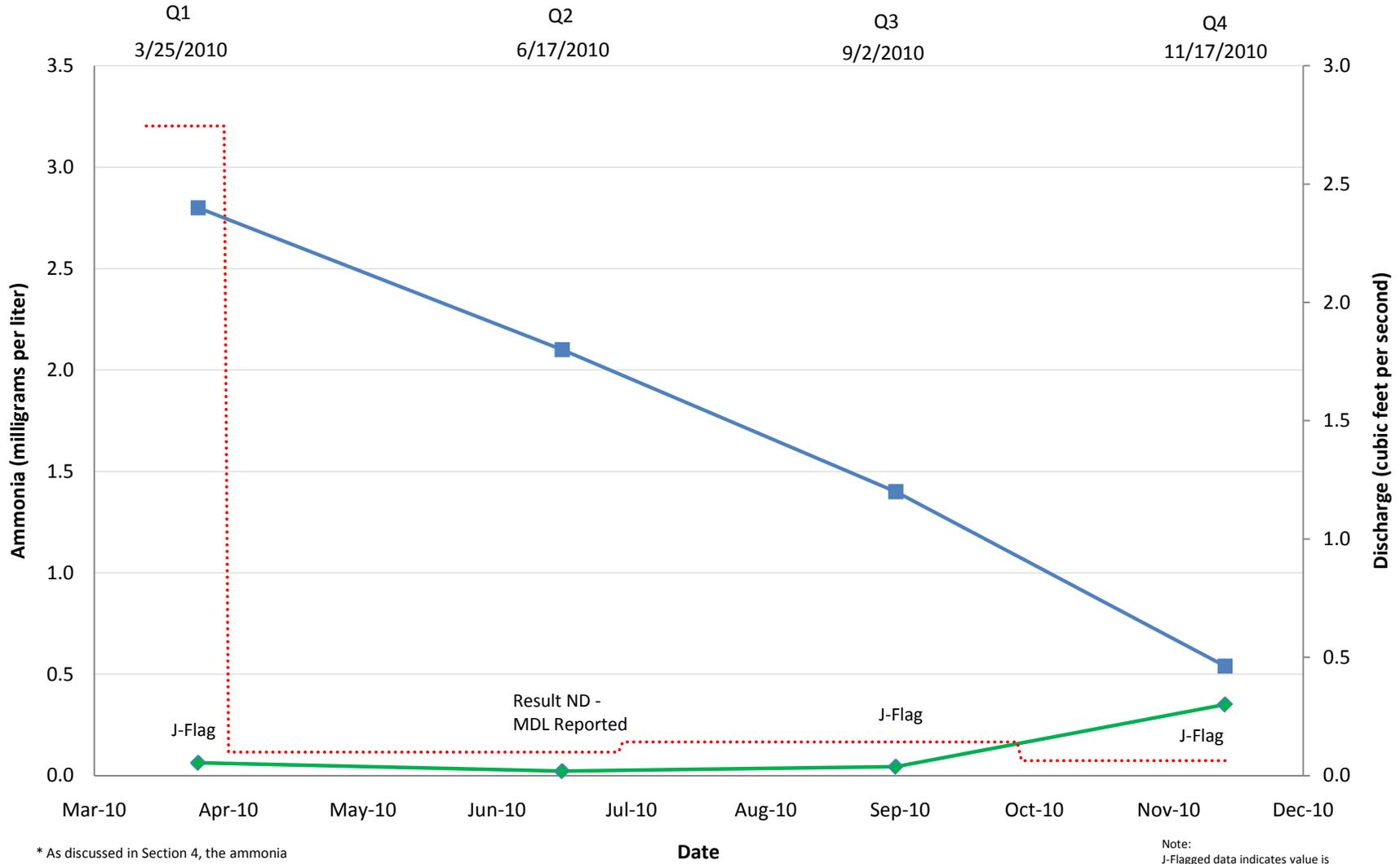


Note: J-Flagged data indicates value is estimated

## Figure 5-4 MS4-BD2 Fecal Coliform Results



### Figure 5-5 MS4-CD1 Ammonia Results

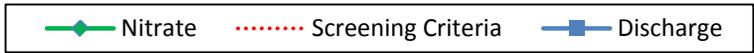
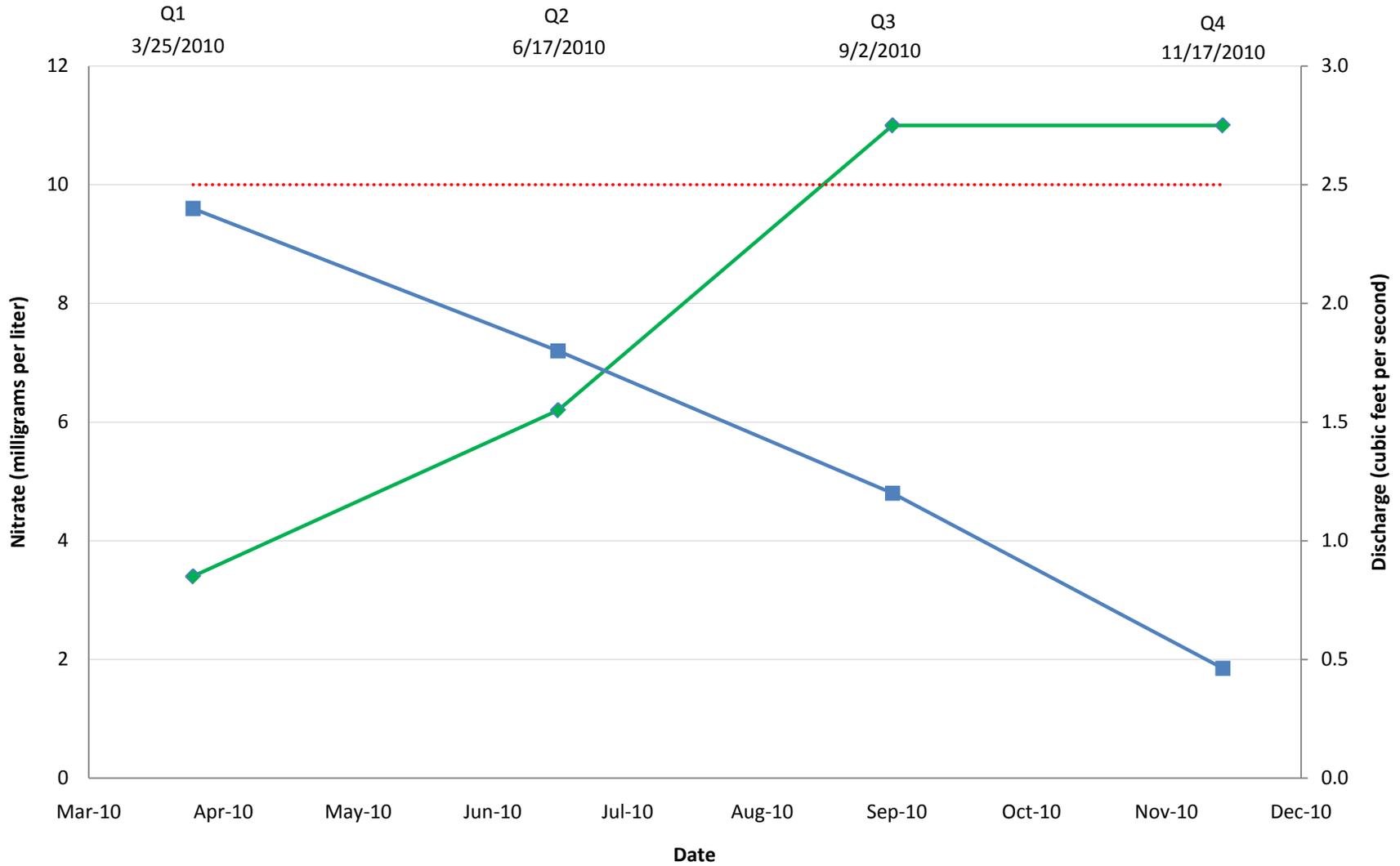


\* As discussed in Section 4, the ammonia standard is calculated quarterly using sampled hardness data for the purpose of standard attainment.

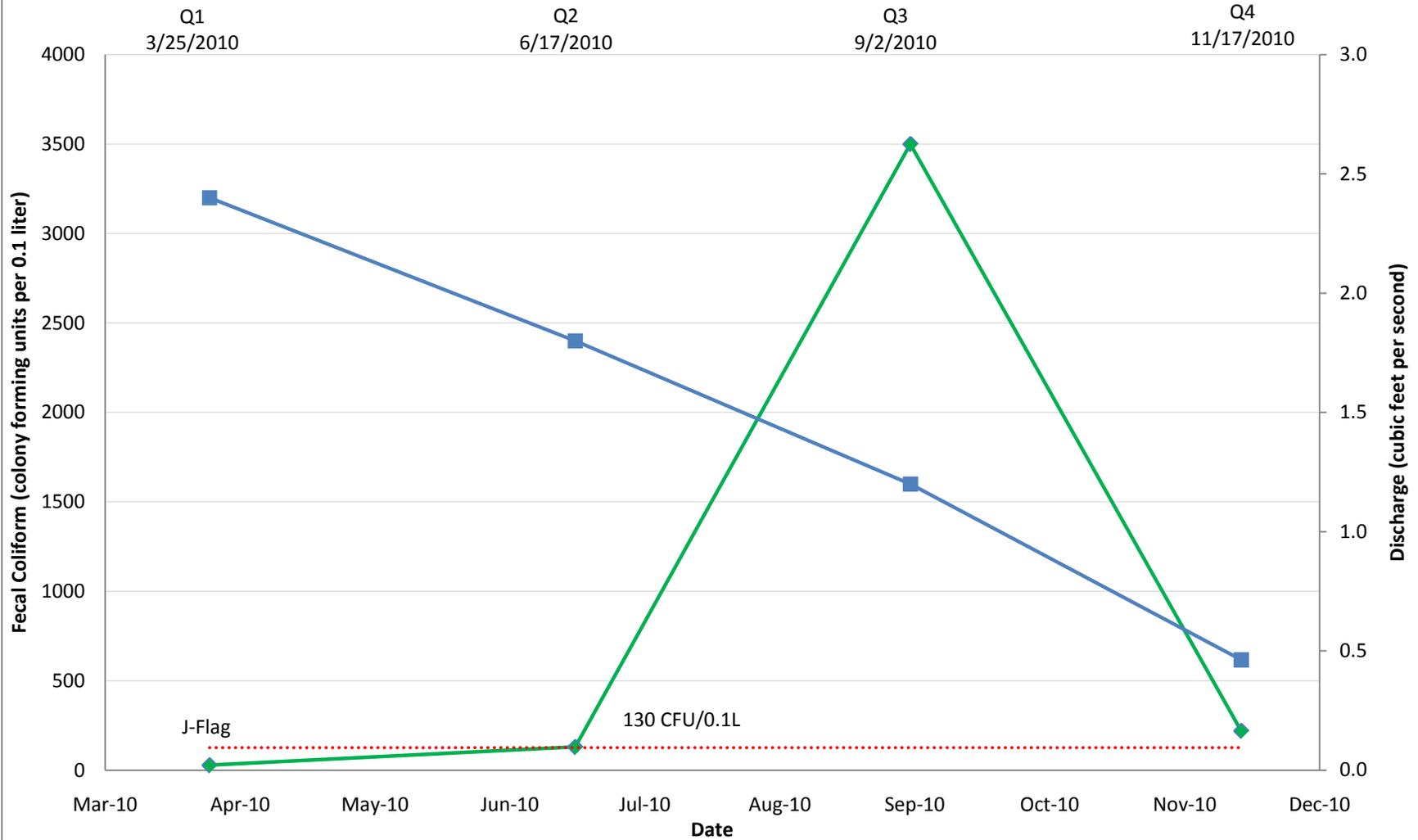
- ◆ Ammonia
- ⋯ Screening Criteria\*
- Discharge

Note:  
 J-Flagged data indicates value is estimated  
 ND - Non Detect  
 MDL - Method Reporting Limit

**Figure 5-6**  
**MS4-CD1 Nitrate Results**

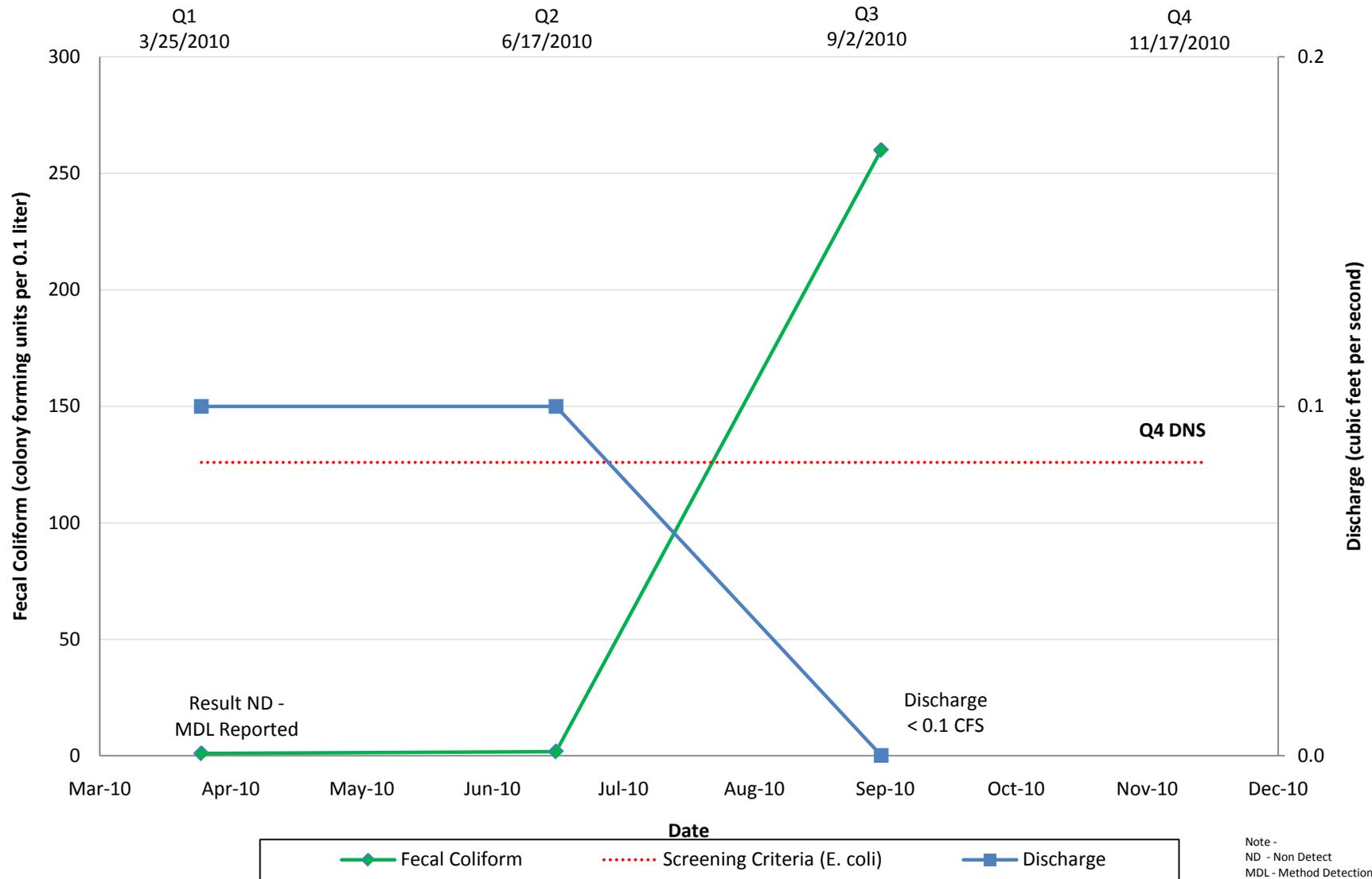


### Figure 5-7 MS4-CD1 Fecal Coliform Results



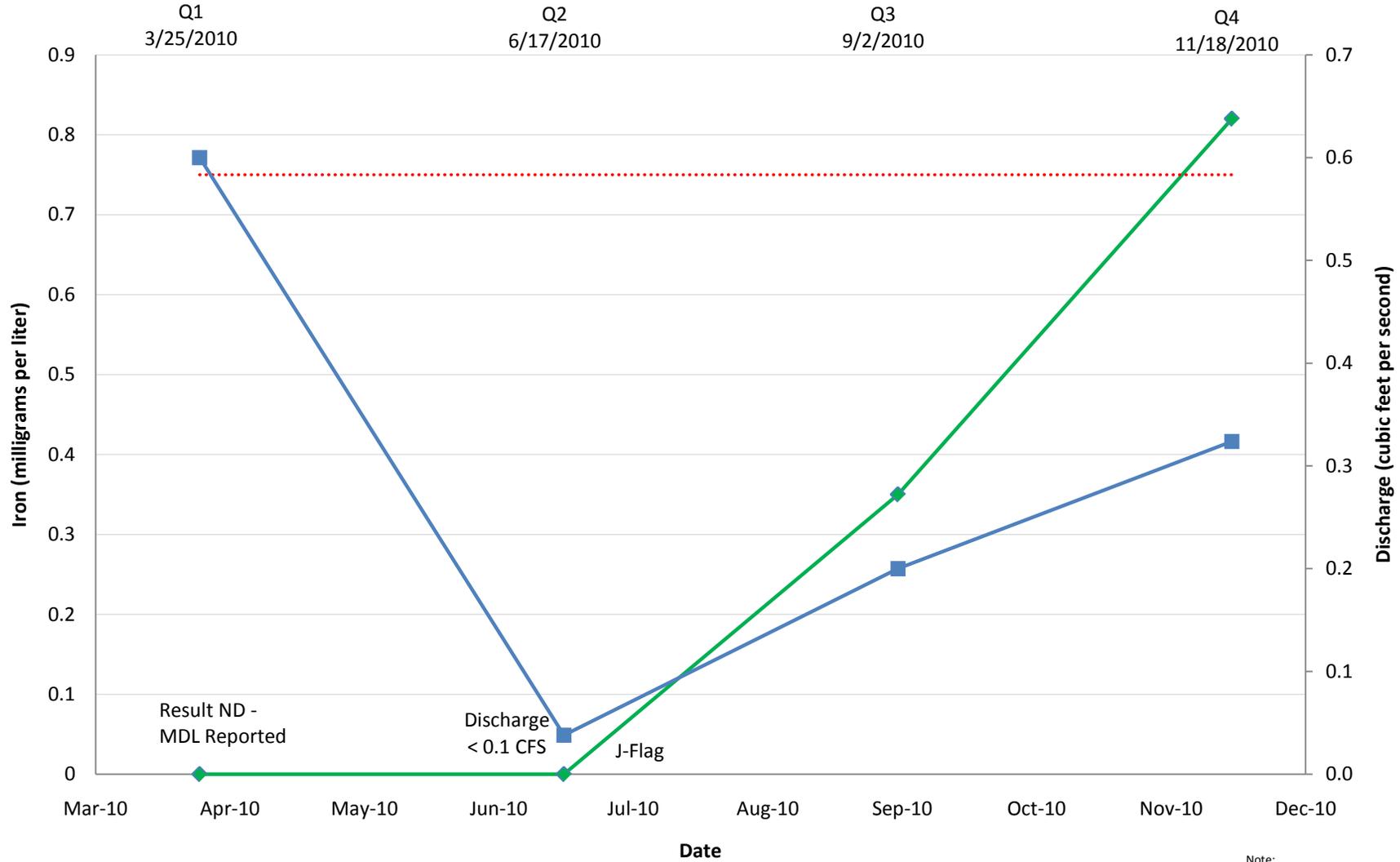
Note: J-Flagged data indicates value is estimated

### Figure 5-8 MS4-CUD3 Fecal Coliform Results



Note -  
 ND - Non Detect  
 MDL - Method Detection Limit  
 DNS - Did Not Sample

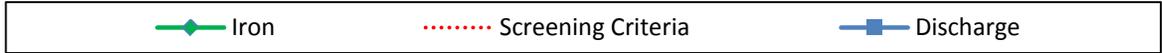
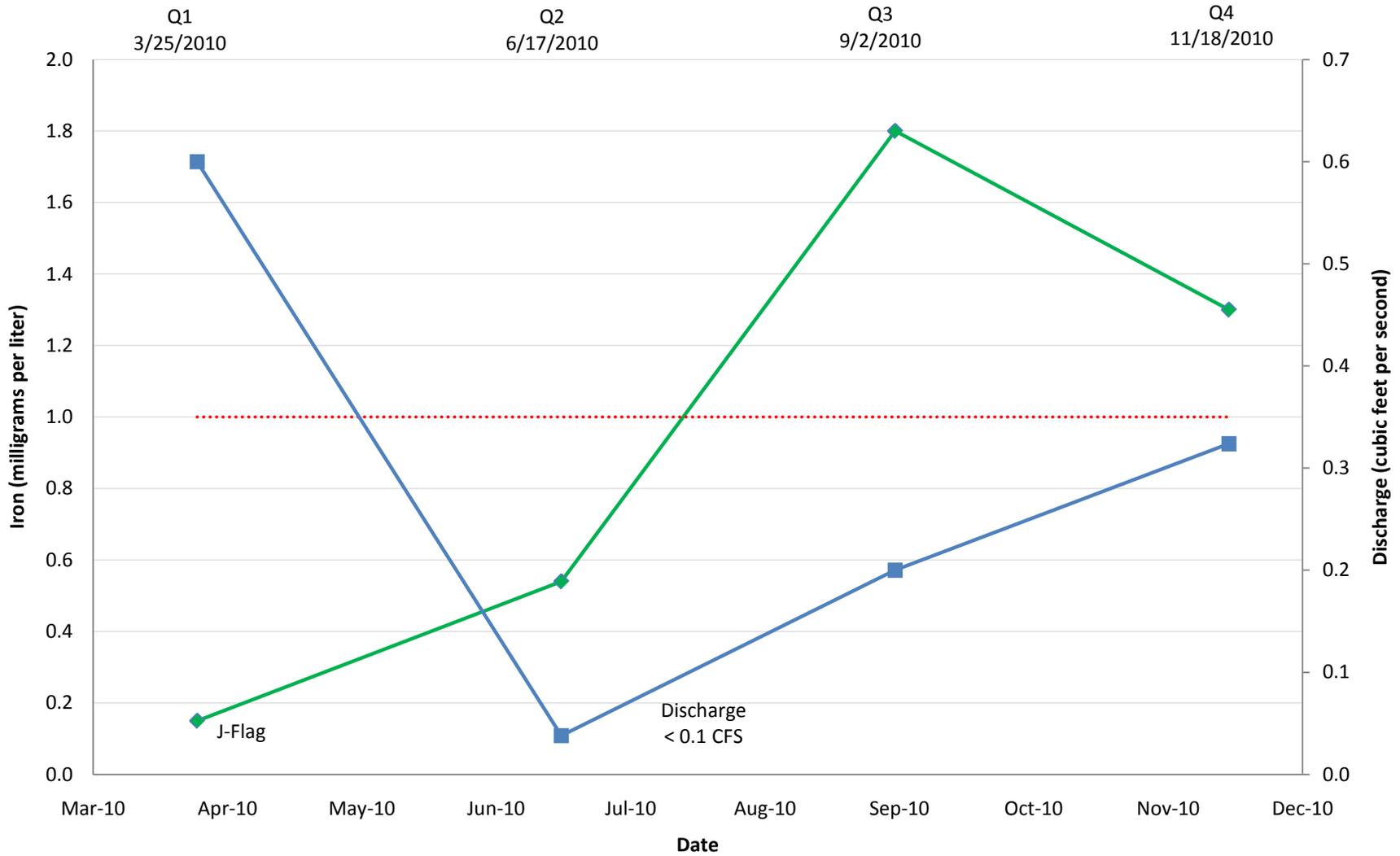
### Figure 5-9 MS4-CUD4 Aluminium Results



◆ Aluminium     
 ⋯ Screening Criteria     
 ■ Discharge

Note:  
 J-Flagged data indicates value is estimated  
 ND - Non Detect  
 MDL - Method Reporting Limit

### Figure 5-10 MS4-CUD4 Iron Results



Note: J-Flagged data indicates value is estimated

**APPENDIX A**  
**PHOTO LOG**

# Appendix A Photo Log



**Photo 1 - Site ID MS4-BD1:** View is looking upstream. Sample location is in bottom right corner of picture.



**Photo 2 - Site ID MS4-BD1:** View is looking downstream. Sample location is in middle of picture.

# Appendix A Photo Log



**Photo 3 - Site ID MS4-BD2:** View is looking upstream. Sample location is marked by fence posts.



**Photo 4 - Site ID MS4-BD2:** View is looking downstream. Sample location is marked by fence posts in center of picture. Fence in background is installation boundary.

# Appendix A Photo Log



**Photo 5 - Site ID MS4-CD1:** View is looking upstream. Sample location is directly behind barbed wire marking installation boundary.



**Photo 6 - Site ID MS4-CUD1:** View is looking upstream. Sample location is in foreground (bottom) of picture.

# Appendix A Photo Log



**Photo 7 - Site ID MS4-CUD1:** View is looking downstream. Sample location is in foreground (bottom) of picture. Fence in picture is installation boundary.



**Photo 8 - Site ID MS4-CUD2:** View is looking upstream. Sample location is in foreground (bottom) of picture.

## Appendix A Photo Log



**Photo 9 - Site ID MS4-CUD2:** View is looking downstream. Sample location is in middle of picture, between silt fence and fence in background marking installation boundary.

## Appendix A Photo Log

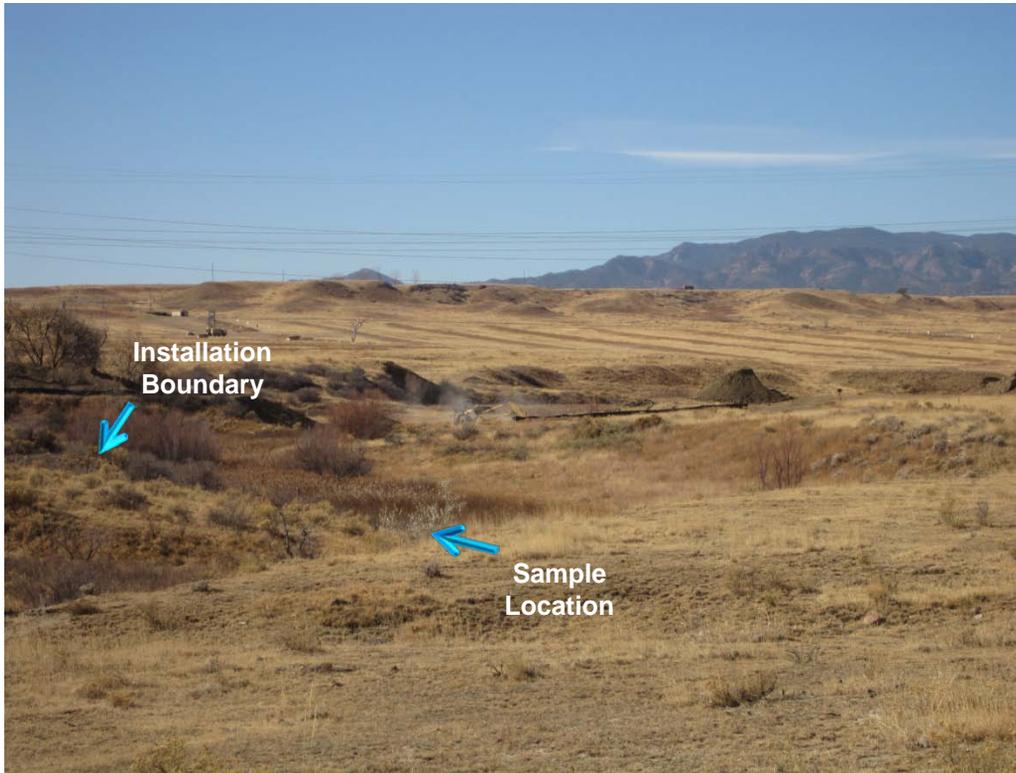


**Photo 10 - Site ID MS4-CUD3:** View is looking upstream. Sample location is marked by the fence post to the right of the channel.



**Photo 11 - Site ID MS4-CUD3:** View is looking downstream. Sample location is behind the photographer, out of view.

# Appendix A Photo Log



**Photo 12 - Site ID MS4-CUD4 :** View is looking upstream onto Fort Carson from hillslope. Installation boundary is marked by barbed wire fence, and sample location is immediately in front of installation boundary in cattails. Note the construction occurring upstream of sample location.



**Photo 13 - Site ID MS4-CUD4:** View is looking upstream. Installation boundary is marked by barbed wire fence. Sample location is immediately in front of installation boundary.

## Appendix A Photo Log



**Photo 14 - Site ID MS4-RC1:** View is looking upstream. Road above channel is Highway 115. Sample location is behind the photographer, out of view.



**Photo 15 - Site ID MS4-RC1:** View is looking downstream. Sample location is in foreground of the picture.

# Appendix A Photo Log



**Photo 16 - Site ID MS4-RC2:** View is looking upstream. Fence post on left side of picture indicates sample location. Barbed wire fence on right side of picture is installation boundary.



**Photo 17 - Site ID MS4-RC2:** View is looking downstream. Fence post in foreground indicates sample location. Barbed wire fence in background is installation boundary.

**APPENDIX B**  
**ANALYTICAL DATA PACKAGE (ON DATA DISC)**