2011 Oil and Gas Development Baseline Water Quality Monitoring Report

North Fork Gunnison River Basin
Delta County, Colorado

Prepared for—

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NORTH FORK GUNNISON RIVER BASIN
DELTA COUNTY, COLORADO

1.0 Introduction and Purpose

In 2011, the NFRIA-WSERC Conservation Center began a program to monitor various tributaries to the North Fork Gunnison River and various water supply sources (springs and wells) that could be affected in the future by proposed nearby natural gas drilling (Figure 1). The purpose of the monitoring is to provide a baseline of water quality conditions in 2011 at the monitored surface and ground water locations from which to compare future water quality conditions if and when new natural gas wells are drilled and developed within the North Fork Gunnison River basin. The intent is to protect water supply sources and the quality of surface streams by tracking and reporting any observed changes to water quality that may result from future natural gas development in the basin.

2.0 Summary of 2011 Activities

In January, July, and November 2011, NFRIA-WSERC staff and trained volunteers collected water quality samples from five surface water locations (Figure 1). These included:

- Milk Creek in the Surface Creek drainage near Cedaredge
- Dever Creek in the Leroux Creek drainage near Hotchkiss
- Hubbard Creek, a tributary to the North Fork Gunnison River near Bowie, and
- West Muddy Creek and East Muddy Creek north of Paonia Reservoir.

These locations are downstream or downgradient from proposed gas permitting sites. In addition, in July 2011, NFRIA-WSERC staff and trained volunteers collected water quality samples from three springs that serve as water supply sources (Figure 1):

- Cave Spring, located a few miles north and east of Hotchkiss
- Belknap Spring, located near Highway 133 east of Hotchkiss, and
- Domestic Pipeline Spring located slightly north of Belknap Spring (Figure 1).

The sample waters were measured in the field for pH, temperature, and specific conductance. If possible, the staff and volunteers measured the flow of the stream or spring when the sample was collected. Samples for laboratory analysis were collected, placed in cooled containers, and submitted to Accutest Laboratories in Wheat Ridge, Colorado, following protocols provided in the Field Sampling Plan and Quality and Assurance Project Plan prepared in 2010 for this monitoring program (NFRIA-WSERC 2010a, 2010b). The samples were analyzed for a long list of volatile organic compounds (only in the spring samples), semi-volatile organic compounds, metals, and general chemistry (cations, anions, nutrients, total and suspended solids) (Tables 1 and 2).

3.0 Water Quality Monitoring Results

Complete analytical results for the 2011 sampling events are provided in Appendix A. The analytical results provide the laboratory reporting limits (RL) and method detection limits (MDL) for each analyte during each sampling event. The surface water sampling results are summarized in Table 1 and spring sampling results are summarized in Table 2.

3.1. Surface Water Results

The surface water sites were not sampled for volatile organic compounds because it is expected that any such compounds would volatilize quickly after entering a stream. However, sixty-five semi-volatile organic compounds were analyzed in each of the 15 surface water samples collected by NFRIA-WSERC in 2011; none of these compounds were detected in any of the samples. Of the eleven total or dissolved metals samples that were analyzed, there were no detections of total arsenic, dissolved cadmium, or dissolved zinc.

Barium is used by the oil and gas industry to make drilling mud. Most surface water contains less than 0.4 mg/L of barium, which is abundant in the Earth's crust. Total barium concentrations ranged from 0.025 mg/L in Milk Creek to 0.186 mg/L in West Muddy Creek. The state water supply standards for barium are a 30-day (chronic) standard of 0.49 mg/L and 1-day (acute) standard of 1 mg/L (CDPHE 2011).

Strontium, also a fairly common element, may be present in the produced water from a natural gas well. Streams generally have less than 1 mg/L of strontium (Capo et al 1998). Total strontium concentrations ranged from 0.092 mg/L in Milk Creek to 0.768

mg/L in Dever Creek. There is not a state water supply or aquatic life standard for strontium. Given that strontium concentrations tend to be higher in ground water, it would appear that ground water is a major source of water to Dever Creek.

Calcium is an abundant element found in sedimentary, igneous and metamorphic rocks, and is generally the predominant cation in streams (Hem 1992). It may be present in elevated concentrations in the formation water in natural gas wells. There is no state water quality standard for calcium. Calcium concentrations ranged from 13.6 mg/L in Milk Creek to 84.6 mg/L in Dever Creek, which is within the normal range for non-saline waters.

Iron may also be present in elevated concentrations in formation water in natural gas wells. In the surface water samples collected in 2011, total iron concentrations ranged from below the detection limit in West Muddy Creek to 1.34 mg/L in Dever Creek. The two other samples collected in Dever Creek in 2011 had total iron concentrations that were an order of magnitude lower. The elevated iron concentration in July was associated with an elevated total suspended solids concentration in the creek during that sampling event (TSS=36 mg/L in July and 5 mg/L or less in January and November). The state standard for total iron is 1.0 mg/L, a chronic standard for aquatic life (CDPHE 2011).

Dissolved magnesium concentrations ranged from 4.8 mg/L in Milk Creek to 54.2 mg/L in Dever Creek. Total manganese concentrations ranged from below the detection limit in Milk Creek to 0.08 mg/L in East Muddy Creek. Dissolved potassium concentrations ranged from below the detection limit in East Muddy Creek to 5.8 mg/L in Dever Creek. Dissolved sodium concentrations ranged from 7.4 mg/L in East Muddy Creek to 50 mg/L in Dever Creek. None of these parameters have primary water supply or aquatic life standards, and none of these values are exceptionally high. Specific conductivity, a measurement of the amount of dissolved solids in water, ranged from less than 200 µS/cm (low) in Milk Creek to nearly 1,000 µS/cm (moderate) in Dever Creek. It is apparent that Dever Creek is the stream with the poorest water quality of those sampled. This is due to local geology, both from the dissolution of minerals from the underlying Mancos and Mesa Verde bedrock (as stated previously, it appears that ground water is a major source of water to Dever Creek), and the transport of suspended sediments from the land surface into the creek.

The general chemistry results show that surface water in the North Fork Gunnison River basin is a bicarbonate water type, has low chloride concentrations, low nutrient concentrations, and generally low dissolved solids and sulfate concentrations. Again, Dever Creek is an exception to the other streams. It contained somewhat elevated, although not high, dissolved solids and sulfate concentrations, and had the highest bicarbonate concentrations. One total phosphorus concentration in Dever Creek was 0.17 mg/L, which exceeds the state's interim standard of 0.11 mg/L for cold water streams (Konowal 2011). The phosphorus was likely present in the creek in association with the elevated suspended sediments on that date, and may be from a natural source or due to agricultural land use in the Dever Creek watershed.

For the analytes that were detected at the five sampled stream locations, there did not appear to be any trends in changing concentrations during 2011. However, it is difficult to discern trends with only three datasets, and without data available during previous years.

3.2. Spring Results

The three water supply springs were sampled for 42 volatile organic compounds and 65 semi-volatile organic compounds. With one exception, there were no detections of any of these compounds. One semi-volatile organic compound, bis(2-Ethylhexyl)phthalate (abbreviated DEHP), was detected at very low concentrations (below the laboratory lower quantitation limit) in the Cave Spring and Belknap Spring samples. DEHP is produced on a massive scale for use as a plasticizer, and is present in many plastic products. Plastics may contain 1 to 40 percent DEHP. Because the DEHP concentration in the Cave and Belknap Spring samples was nearly the same in both samples (about 1 µg/L), it is likely that the samples were contaminated during collection, possibly from the plastic sample gloves used by the samplers. The acceptable maximum contaminant level in public water supplies is 6 µg/L, and the state's health-based standard is 2.5 µg/L (CDPHE 2011).

Metal concentrations in the spring samples were fairly low, although calcium concentrations (37.7 to 62.7 mg/L) and sodium concentrations (39 to 48.4 mg/L) were somewhat elevated, but typical for ground water, indicating that ground water is a source of supply to the springs. Cadmium and zinc were not detected in any of the spring samples, magnesium concentrations were fairly low, and potassium concentrations were low. The general chemistry analyses show that the water supply to the springs is a bicarbonate type water, with low chloride, nutrient, and, with one exception, low sulfate concentrations. The sulfate concentration in Belknap Spring was somewhat elevated (104 mg/L), but well below the secondary drinking water standard of 250 mg/L (CDPHE 2011). The dissolved solids concentrations ranged from 332 mg/L in the Domestic Pipeline Spring to 480 mg/L in Belknap Spring; the EPA recommended drinking water standard is 500 mg/L. The pH range in the springs was 7.3 to 7.8, indicating that the spring water is slightly alkaline.

It appears that the springs, although somewhat mineralized due to the nature of the geologic materials along the flow path, provide good quality water to the water companies who use these springs for water supply. It appears that the springs are not affected by any upgradient human activities that have the potential to degrade water quality. The springs should continue to be monitored to evaluate any long term trends or changes in water quality.

4.0 Conclusions and Recommendations

The surface and spring samples collected in 2011 appear to indicate baseline, natural conditions unaffected by oil and gas drilling. Baseline water quality sampling should continue in 2012 and for as long as possible before any future natural gas drilling and gas extraction begins in the North Fork Gunnison River basin. With more water quality data available, it will be possible to establish natural trends in water quality, such as those that occur seasonally or during wet or drought periods. With such information available, it will be more likely that any impacts due to natural gas development will be more easily observable and separable from natural conditions.

There were no detections (except for very low detections of DEHP in two of the springs) of volatile or semi-volatile organic compounds. Some volatile and semi-volatile organic compounds occur naturally, so baseline monitoring of these compounds should continue. However, given the 2011 results, annual sampling for the volatile and semi-volatile organic compounds is likely adequate. It is recommended that NFRIA-WSERC sample for these compounds during the same month every year during a period when ground water likely contributes a larger proportion of the stream and spring flow than during periods of snow melt and runoff ; sometime between late July and October would be preferable. If possible, it is recommended to sample creeks and springs seasonally for metals, general chemistry, and field parameters.

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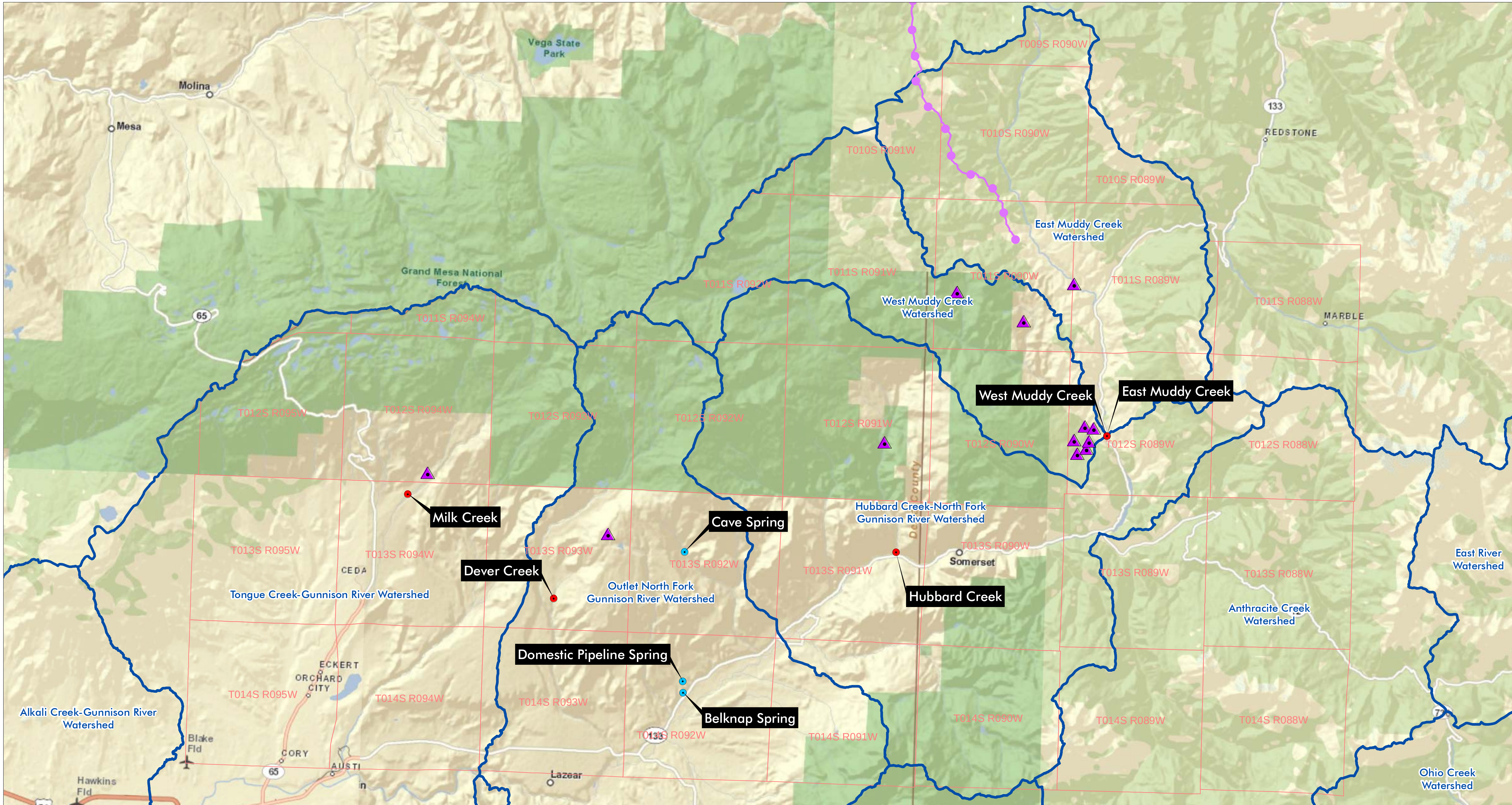
NFRIA-WSERC Conservation Center. 2010b. North Fork and Lower Gunnison River Watershed Oil & Gas Water Quality Monitoring Plan: Quality Assurance Project Plan. Prepared by NFRIA-WSERC Conservation Center and ERO Resources Corporation. December 15.

Appendix A— Laboratory Results for January, July and November 2011 Sampling



- Spring Water Quality Sampling Location
- Surface Water Quality Sampling Location
- Natural Gas Permit
- Bull Mountain Pipeline
- Watershed Boundary
- Township and Range

0 1.5 3 Miles

N

Figure 1
NFRIA-WSERC 2011 Oil and Gas Water Quality Monitoring Locations

Prepared for: NFRIA-WSERC Conservation Center
File: 5111 Figure 1 july stations.mxd (WH)
December 2011

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Table 1. Surface Water Sampling Results

Client Sample ID:		G-01					G-02					G-06					G-07					G-08					Sample Blank	Cooler Blank	Sample Blank	Colorado Water Supply Standard [1]
Site Name		Milk Ck					Dever Ck					Hubbard Ck					West Muddy Ck					East Muddy Ck								
Date Sampled:	Units	1/19/2011	7/26/2011	7/26/2011	11/21/2011	11/21/2011	1/19/2011	7/26/2011	7/26/2011	11/21/2011	11/21/2011	1/19/2011	7/26/2011	7/26/2011	11/21/2011	11/21/2011	1/19/2011	7/26/2011	7/26/2011	11/21/2011	11/21/2011	1/19/2011	7/26/2011	7/26/2011	11/21/2011	11/21/2011	1/19/2011	1/19/2011	7/26/2011	
GC/MS Semi-volatiles (SW846 8270C)																														
Benzoic Acid	ug/l	ND (4.1)	ND (7.4)	-	ND (7.1)	-	ND (4.1)	ND (8.2)	-	ND (7.1)	-	ND (4.1)	ND (7.2)	-	ND (7.3)	-	ND (4.1)	ND (7.2)	-	ND (7.3)	-	ND (4.1)	ND (7.5)	-	ND (7.2)	-	ND (4.8)	ND (4.1)	-	NS
2-Chlorophenol	ug/l	ND (1.2)	ND (0.57)	-	ND (0.55)	-	ND (1.2)	ND (0.64)	-	ND (0.55)	-	ND (1.2)	ND (0.56)	-	ND (0.56)	-	ND (1.2)	ND (0.56)	-	ND (0.56)	-	ND (1.2)	ND (0.58)	-	ND (0.56)	-	ND (1.4)	ND (1.2)	-	35
4-Chloro-3-methyl phenol	ug/l	ND (2.5)	ND (0.49)	-	ND (0.48)	-	ND (2.5)	ND (0.55)	-	ND (0.48)	-	ND (2.5)	ND (0.48)	-	ND (0.49)	-	ND (2.5)	ND (0.48)	-	ND (0.49)	-	ND (2.5)	ND (0.50)	-	ND (0.48)	-	ND (2.9)	ND (2.5)	-	210
2,4-Dichlorophenol	ug/l	ND (1.7)	ND (0.51)	-	ND (0.50)	-	ND (1.7)	ND (0.57)	-	ND (0.50)	-	ND (1.7)	ND (0.50)	-	ND (0.50)	-	ND (1.7)	ND (0.50)	-	ND (0.50)	-	ND (1.7)	ND (0.52)	-	ND (0.50)	-	ND (2.0)	ND (1.7)	-	21
2,4-Dimethylphenol	ug/l	ND (1.0)	ND (0.83)	-	ND (0.81)	-	ND (1.0)	ND (0.93)	-	ND (0.81)	-	ND (1.0)	ND (0.82)	-	ND (0.83)	-	ND (1.0)	ND (0.81)	-	ND (0.83)	-	ND (1.0)	ND (0.85)	-	ND (0.82)	-	ND (1.2)	ND (1.0)	-	140
2,4-Dinitrophenol	ug/l	ND (1.2)	ND (3.9)	-	ND (3.8)	-	ND (1.2)	ND (4.4)	-	ND (3.8)	-	ND (1.2)	ND (3.8)	-	ND (3.9)	-	ND (1.2)	ND (3.8)	-	ND (3.9)	-	ND (1.2)	ND (4.0)	-	ND (3.8)	-	ND (1.4)	ND (1.2)	-	14
4,6-Dinitro-o-cresol	ug/l	ND (1.0)	ND (4.9)	-	ND (4.8)	-	ND (1.0)	ND (5.5)	-	ND (4.8)	-	ND (1.0)	ND (4.8)	-	ND (4.9)	-	ND (1.0)	ND (4.8)	-	ND (4.9)	-	ND (1.0)	ND (5.0)	-	ND (4.8)	-	ND (1.2)	ND (1.0)	-	0.27
2-Methylphenol	ug/l	ND (2.5)	ND (0.54)	-	ND (0.52)	-	ND (2.5)	ND (0.60)	-	ND (0.52)	-	ND (2.5)	ND (0.53)	-	ND (0.53)	-	ND (2.5)	ND (0.53)	-	ND (0.53)	-	ND (2.5)	ND (0.55)	-	ND (0.53)	-	ND (2.9)	ND (2.5)	-	NS
4-Methylphenol	ug/l	ND (1.8)	ND (0.50)	-	ND (0.49)	-	ND (1.8)	ND (0.56)	-	ND (0.49)	-	ND (1.8)	ND (0.49)	-	ND (0.50)	-	ND (1.8)	ND (0.49)	-	ND (0.50)	-	ND (1.8)	ND (0.51)	-	ND (0.49)	-	ND (2.1)	ND (1.8)	-	NS
2-Nitrophenol	ug/l	ND (2.0)	ND (0.55)	-	ND (0.53)	-	ND (2.0)	ND (0.62)	-	ND (0.53)	-	ND (2.0)	ND (0.54)	-	ND (0.54)	-	ND (2.0)	ND (0.54)	-	ND (0.54)	-	ND (2.0)	ND (0.56)	-	ND (0.54)	-	ND (2.4)	ND (2.0)	-	NS
4-Nitrophenol	ug/l	ND (1.1)	ND (2.9)	-	ND (2.9)	-	ND (1.1)	ND (3.3)	-	ND (2.9)	-	ND (1.1)	ND (2.9)	-	ND (2.9)	-	ND (1.1)	ND (2.9)	-	ND (2.9)	-	ND (1.1)	ND (3.0)	-	ND (2.9)	-	ND (1.3)	ND (1.1)	-	56
Pentachlorophenol	ug/l	ND (1.3)	ND (0.69)	-	ND (0.67)	-	ND (1.3)	ND (0.77)	-	ND (0.67)	-	ND (1.3)	ND (0.67)	-	ND (0.68)	-	ND (1.3)	ND (0.67)	-	ND (0.68)	-	ND (1.3)	ND (0.70)	-	ND (0.67)	-	ND (1.5)	ND (1.3)	-	1
Phenol	ug/l	ND (2.2)	ND (0.49)	-	ND (0.48)	-	ND (2.2)	ND (0.55)	-	ND (0.48)	-	ND (2.2)	ND (0.48)	-	ND (0.49)	-	ND (2.2)	ND (0.48)	-	ND (0.49)	-	ND (2.2)	ND (0.50)	-	ND (0.48)	-	ND (2.6)	ND (2.2)	-	2,100
2,4,5-Trichlorophenol	ug/l	ND (1.3)	ND (0.76)	-	ND (0.74)	-	ND (1.3)	ND (0.86)	-	ND (0.74)	-	ND (1.3)	ND (0.75)	-	ND (0.76)	-	ND (1.3)	ND (0.75)	-	ND (0.76)	-	ND (1.3)	ND (0.78)	-	ND (0.75)	-	ND (1.5)	ND (1.3)	-	700
2,4,6-Trichlorophenol	ug/l	ND (1.7)	ND (0.58)	-	ND (0.56)	-	ND (1.7)	ND (0.65)	-	ND (0.56)	-	ND (1.7)	ND (0.57)	-	ND (0.57)	-	ND (1.7)	ND (0.56)	-	ND (0.57)	-	ND (1.7)	ND (0.59)	-	ND (0.57)	-	ND (2.0)	ND (1.7)	-	3.2
Acenaphthene	ug/l	ND (1.0)	ND (0.62)	-	ND (0.60)	-	ND (1.0)	ND (0.69)	-	ND (0.60)	-	ND (1.0)	ND (0.61)	-	ND (0.61)	-	ND (1.0)	ND (0.60)	-	ND (0.61)	-	ND (1.0)	ND (0.63)	-	ND (0.61)	-	ND (1.2)	ND (1.0)	-	420
Acenaphthylene	ug/l	ND (1.0)	ND (0.62)	-	ND (0.60)	-	ND (1.0)	ND (0.69)	-	ND (0.60)	-	ND (1.0)	ND (0.61)	-	ND (0.61)	-	ND (1.0)	ND (0.60)	-	ND (0.61)	-	ND (1.0)	ND (0.63)	-	ND (0.61)	-	ND (1.2)	ND (1.0)	-	NS
Anthracene	ug/l	ND (1.3)	ND (0.49)	-	ND (0.48)	-	ND (1.3)	ND (0.55)	-	ND (0.48)	-	ND (1.3)	ND (0.48)	-	ND (0.49)	-	ND (1.3)	ND (0.48)	-	ND (0.49)	-	ND (1.3)	ND (0.50)	-	ND (0.48)	-	ND (1.5)	ND (1.3)	-	2,100
Benzo(a)anthracene	ug/l	ND (1.0)	ND (0.49)	-	ND (0.48)	-	ND (1.0)	ND (0.55)	-	ND (0.48)	-	ND (1.0)	ND (0.48)	-	ND (0.49)	-	ND (1.0)	ND (0.48)	-	ND (0.49)	-	ND (1.0)	ND (0.50)	-	ND (0.48)	-	ND (1.2)	ND (1.0)	-	0.0048
Benzo(a)pyrene	ug/l	ND (0.90)	ND (0.49)	-	ND (0.48)	-	ND (0.90)	ND (0.55)	-	ND (0.48)	-	ND (0.90)	ND (0.48)	-	ND (0.49)	-	ND (0.90)	ND (0.48)	-	ND (0.49)	-	ND (0.90)	ND (0.50)	-	ND (0.48)	-	ND (1.1)	ND (0.90)	-	0.2
Benzo(b)fluoranthene	ug/l	ND (1.4)	ND (0.49)	-	ND (0.48)	-	ND (1.4)	ND (0.55)	-	ND (0.48)	-	ND (1.4)	ND (0.48)	-	ND (0.49)	-	ND (1.4)	ND (0.48)	-	ND (0.49)	-	ND (1.4)	ND (0.50)	-	ND (0.48)	-	ND (1.6)	ND (1.4)	-	0.0048
Benzo(g,h,i)perylene	ug/l	ND (2.0)	ND (0.56)	-	ND (0.54)	-	ND (2.0)	ND (0.63)	-	ND (0.54)	-	ND (2.0)	ND (0.55)	-	ND (0.55)	-	ND (2.0)	ND (0.55)	-	ND (0.55)	-	ND (2.0)	ND (0.57)	-	ND (0.55)	-	ND (2.4)	ND (2.0)	-	NS
Benzo(k)fluoranthene	ug/l	ND (1.0)	ND (0.49)	-	ND (0.48)	-	ND (1.0)	ND (0.55)	-	ND (0.48)	-	ND (1.0)	ND (0.48)	-	ND (0.49)	-	ND (1.0)	ND (0.48)	-	ND (0.49)	-	ND (1.0)	ND (0.50)	-	ND (0.48)	-	ND (1.2)	ND (1.0)	-	0.0048
4-Bromophenyl phenyl ether	ug/l	ND (1.5)	ND (0.49)	-	ND (0.48)	-	ND (1.5)	ND (0.55)	-	ND (0.48)	-	ND (1.5)	ND (0.48)	-	ND (0.49)	-	ND (1.5)	ND (0.48)	-	ND (0.49)	-	ND (1.5)	ND (0.50)	-	ND (0.48)	-	ND (1.8)	ND (1.5)	-	NS
Butyl benzyl phthalate	ug/l	ND (1.1)	ND (0.49)	-	ND (0.48)	-	ND (1.1)	ND (0.55)	-	ND (0.48)	-	ND (1.1)	ND (0.48)	-	ND (0.49)	-	ND (1.1)	ND (0.48)	-	ND (0.49)	-	ND (1.1)	ND (0.50)	-	ND (0.48)	-	ND (1.3)	ND (1.1)	-	1,400
Benzyl Alcohol	ug/l	ND (2.0)	ND (0.63)	-	ND (0.61)	-	ND (2.0)	ND (0.70)	-	ND (0.61)	-	ND (2.0)	ND (0.62)	-	ND (0.62)	-	ND (2.0)	ND (0.61)	-	ND (0.62)	-	ND (2.0)	ND (0.64)	-	ND (0.62)	-	ND (2.4)	ND (2.0)	-	NS
2-Chloronaphthalene	ug/l	ND (1.8)	ND (0.65)	-	ND (0.63)	-	ND (1.8)	ND (0.73)	-	ND (0.63)	-	ND (1.8)	ND (0.63)	-	ND (0.64)	-	ND (1.8)	ND (0.63)	-	ND (0.64)	-	ND (1.8)	ND (0.66)	-	ND (0.63)	-	ND (2.1)	ND (1.8)	-	NS
4-Chloroaniline	ug/l	ND (1.0)	ND (0.50)	-	ND (0.49)	-	ND (1.0)	ND (0.56)	-	ND (0.49)	-	ND (1.0)	ND (0.49)	-	ND (0.50)	-	ND (1.0)	ND (0.49)	-	ND (0.50)	-	ND (1.0)	ND (0.51)	-	ND (0.49)	-	ND (1.2)	ND (1.0)	-	NS
Chrysene	ug/l	ND (1.0)	ND (0.49)	-	ND (0.48)	-	ND (1.0)	ND (0.55)	-	ND (0.48)	-	ND (1.0)	ND (0.48)	-	ND (0.49)	-	ND (1.0)	ND (0.48)	-	ND (0.49)	-	ND (1.0)	ND (0.50)	-	ND (0.48)	-	ND (1.2)	ND (1.0)	-	0.0048
bis(2-Chloroethoxy)methane	ug/l	ND (2.2)	ND (0.68)	-	ND (0.66)	-	ND (2.2)	ND (0.76)	-	ND (0.66)	-	ND (2.2)	ND (0.66)	-	ND (0.67)	-	ND (2.2)	ND (0.66)	-	ND (0.67)	-	ND (2.2)	ND (0.69)	-	ND (0.66)	-	ND (2.6)	ND (2.2)	-	NS
bis(2-Chloroethyl)ether	ug/l	ND (1.0)	ND (0.71)	-	ND (0.69)	-	ND (1.0)	ND (0.79)	-	ND (0.69)	-	ND (1.0)	ND (0.69)	-	ND (0.70)	-	ND (1.0)	ND (0.69)	-	ND (0.70)	-	ND (1.0)	ND (0.72)	-	ND (0.69)	-	ND (1.2)	ND (1.0)	-	0.032
bis(2-Chloroisopropyl)ether	ug/l	ND (2.5)	ND (0.66)	-	ND (0.64)	-	ND (2.5)	ND (0.74)	-	ND (0.64)	-	ND (2.5)	ND (0.64)	-	ND (0.65)	-	ND (2.5)	ND (0.64)	-	ND (0.65)	-	ND (2.5)	ND (0.67)	-	ND (0.64)	-	ND (2.9)	ND (2.5)	-	280
4-Chlorophenyl phenyl ether	ug/l	ND (2.5)	ND (0.55)	-	ND (0.53)	-	ND (2.5)	ND (0.62)	-	ND (0.53)	-	ND (2.5)	ND (0.54)	-	ND (0.54)	-	ND (2.5)	ND (0.54)	-	ND (0.54)	-	ND (2.5)	ND (0.56)	-	ND (0.54)	-	ND (2.9)	ND (2.5)	-	NS
1,2-Dichlorobenzene	ug/l	ND (1.0)	ND (0.73)	-	ND (0.70)	-	ND (1.0)	ND (0.81)	-	ND (0.70)	-	ND (1.0)	ND (0.71)	-	ND (0.72)	-	ND (1.0)	ND (0.71)	-	ND (0.72)	-	ND (1.0)	ND (0.74)	-	ND (0.71)	-	ND (1.2)	ND (1.0)	-	600
1,3-Dichlorobenzene	ug/l	ND (1.0)	ND (0.88)	-	ND (0.86)	-	ND (1.0)	ND (0.99)	-	ND (0.86)	-	ND (1.0)	ND (0.87)	-	ND (0.87)	-	ND (1.0)	ND (0.86)	-	ND (0.87)	-	ND (1.0)	ND (0.90)	-	ND (0.87)	-	ND (1.2)	ND (1.0)	-	94
1,4-Dichlorobenzene	ug/l	ND (1.0)	ND (0.75)	-	ND (0.72)	-	ND (1.0)	ND (0.84)	-	ND (0.72)	-	ND (1.0)	ND (0.73)	-	ND (0.74)	-	ND (1.0)	ND (0.73)	-	ND (0.74)	-	ND (1.0)	ND (0.76)	-	ND (0.73)	-	ND (1.2)	ND (1.0)	-	75
2,4-Dinitrotoluene	ug/l	ND (1.0)	ND (0.49)	-	ND (0.48)	-	ND (1.0)	ND (0.55)	-	ND (0.48)	-	ND (1.0)	ND (0.48)	-	ND (0.49)	-	ND (1.0)	ND (0.48)	-	ND (0.49)	-	ND (1.0)	ND (0.50)	-	ND (0.48)	-	ND (1.2)	ND (1.0)	-	0.11
2,6-Dinitrotoluene	ug/l	ND (1.8)	ND (0.49)	-	ND (0.48)	-	ND (1.8)	ND (0.55)	-	ND (0.48)	-	ND (1.8)	ND (0.48)	-	ND (0.49)	-	ND (1.8)	ND (0.48)	-	ND (0.49)	-	ND (1.8)	ND (0.50)	-	ND (0.48)	-	ND (2.1)	ND (1.8)	-	NS
3,3'-Dichlorobenzidine	ug/l	ND (1.0)	ND (0.60)	-	ND (0.58)	-	ND (1.0)	ND (0.67)	-	ND (0.58)	-	ND (1.0)	ND (0.59)	-	ND (0.59)	-	ND (1.0)	ND (0.58)	-	ND (0.59)	-	ND (1.0)	ND (0.61)	-	ND (0.59)	-	ND (1.2)	ND (1.0)	-	0.078
Dibenzo(a,h)anthracene	ug/l	ND (1.6)	ND (0.80)	-	ND (0.78)	-	ND (1.6)	ND (0.90)	-	ND (0.78)	-	ND (1.6)	ND (0.79)	-	ND (0.80)	-	ND (1.6)	ND (0.78)	-	ND (0.80)	-	ND (1.6)	ND (0.82)	-	ND (0.79)	-	ND (1.9)	ND (1.6)	-	0.0048
Dibenzofuran	ug/l	ND (1.8)	ND (0.57)	-	ND (0.55)	-	ND (1.8)	ND (0.64)	-	ND (0.55)	-	ND (1.8)	ND (0.56)	-	ND (0.56)	-	ND (1.8)	ND (0.56)	-	ND (0.56)	-	ND (1.8)	ND (0.58)	-	ND (0.56)	-	ND (2.1)	ND (1.8)	-	NS
Di-n-butyl phthalate	ug/l	ND (1.3)	ND (0.51)	-	ND (0.50)	-	ND (1.3)	ND (0.57)	-	ND (0.50)	-	ND (1.3)	ND (0.50)	-	ND (0.50)	-	ND (1.3)	ND (0.50)	-	ND (0.50)	-	ND (1.3)	ND (0.52)	-	ND (0.50)	-	ND (1.5)	ND (1.3)	-	700
Di-n-octyl phthalate	ug/l	ND (1.8)	ND (0.51)	-	ND (0.50) [a]	-	ND (1.8)	ND (0.57)	-	ND (0.50) [a]	-	ND (1.8)	ND (0.50)	-	ND (0.50)	-	ND (1.8)	ND (0.50)	-	ND (0.50)	-	ND (1.8)	ND (0.52)	-	ND (0.50) [a]	-	ND (2.1)	ND (1.8)	-	NS
Diethyl phthalate	ug/l	ND (2.0)	ND (0.49)	-	ND (0.48)	-	ND (2.0)	ND (0.55)	-	ND (0.48)	-	ND (2.0)	ND (0.48)	-	ND (0.49)	-	ND (2.0)	ND (0.48)	-	ND (0.49)	-	ND (2.0)	ND (0.50)	-	ND (0.48)	-	ND (2.4)	ND (2.0)	-	5,600
Dimethyl phthalate	ug/l	ND (2.0)	ND (0.49)	-	ND (0.48)	-	ND (2.0)	ND (0.55)	-	ND (0.48)	-	ND (2.0)	ND (0.48)	-	ND (0.49)	-	ND (2.0)	ND (0.48)	-	ND (0.49)	-	ND (2.0)	ND (0.50)	-	ND (0.48)	-	ND (2.4)	ND (2.0)	-	70,000
bis(2-Ethylhexyl)phthalate	ug/l	ND (1.5)	ND (0.69)	-	ND (1.6)	-	ND (1.5)	ND (0.77)	-	ND (1.6)	-	ND (1.5)	ND (0.67)	-	ND (1.7)	-	ND (1.5)	ND (0.67)	-	ND (1.7)	-	ND (1.5)	ND (0.70)	-	ND (1.6)	-	ND (1.8)	ND (1.5)	-	6
Fluoranthene	ug/l	ND (1.2)	ND (0.74)	-	ND (0.71)	-	ND (1.2)	ND (0.82)	-	ND (0.71)	-	ND (1.2)	ND (0.72)	-	ND (0.73)	-	ND (1.2)	ND (0.72)	-	ND (0.73)	-	ND (1.2)	ND (0.75)	-	ND (0.72)	-	ND (1.4)	ND (1.2)	-	280
Fluorene	ug/l	ND (1.4)	ND (0.57)	-	ND (0.55)	-	ND (1.4)	ND (0.64)	-	ND (0.55)	-	ND (1.4)	ND (0.56)	-	ND (0.56)	-	ND (1.4)	ND (0.56)	-	ND (0.56)	-	ND (1.4)	ND (0.58)	-	ND (0.56)	-	ND (1.6)	ND (1.4)	-	280
Hexachlorobenzene	ug/l	ND (2.0)	ND (0.49)	-	ND (0.48)	-	ND (2.0)	ND (0.55)	-	ND (0.48)	-	ND (2.0)	ND (0.48)	-	ND (0.49)	-	ND (2.0)	ND (0.48)	-	ND (0.49)	-	ND (2.0)	ND (0.50)	-	ND (0.48)	-	ND (2.4)	ND (2.0)	-	1
Hexachlorobutadiene	ug/l	ND (1.0)	ND (0.78)	-	ND (0.76)	-	ND (1.0)	ND (0.88)	-	ND (0.76)	-	ND (1.0)	ND (0.77)	-	ND (0.78)	-	ND (1.0)	ND (0.77)	-	ND (0.78)	-	ND (1.0)	ND (0.80)	-	ND (0.77)	-	ND (1.2)	ND (1.0)	-	0.45
Hexachlorocyclopentadiene	ug/l	ND (1.8)	ND (4.9)	-	ND (4.8)	-	ND (1.8)	ND (5.5)	-	ND (4.8)	-	ND (1.8)	ND (4.8)	-	ND (4.9)	-	ND (1.8)	ND (4.8)	-	ND (4.9)	-	ND (1.8)	ND (5.0)	-	ND (4.8)	-	ND (2.1)	ND (1.8)	-	50
Hexachloroethane	ug/l	ND (1.0)	ND (0.98)	-	ND (0.95)	-	ND (1.0)	ND (1.1)	-	ND (0.95)	-	ND (1.0)	ND (0.96)	-	ND (0.97)	-	ND (1.0)	ND (0.96)	-	ND (0.97)	-	ND (1.0)	ND (1.0)	-	ND (0.96)	-	ND (1.2)	ND (1.0)	-	0.7
Indeno(1,2,3-cd)pyrene	ug/l	ND (1.6)	ND (1.6)	-	ND (1.6)	-	ND (1.6)	ND (1.8)	-	ND (1.6)	-	ND (1.6)	ND (1.6)	-	ND (1.6)	-	ND (1.6)	ND (1.6)	-	ND (1.6)	-	ND (1.6)	ND (1.6)	-	ND (1.6)	-	ND (1.9)	ND (1.6)	-	0.0048
Isophorone	ug/l	ND (1.0)	ND (0.60)	-	ND (0.58)	-	ND (1.0)	ND (0.67)	-	ND (0.58)	-	ND (1.0)	ND (0.59)	-	ND (0.59)	-	ND (1.0)	ND (0.58)	-	ND (0.59)	-	ND (1.0)	ND (0.61)	-	ND (0.59)	-	ND (1.2)	ND (1.0)	-	140
2-Methylnaphthalene	ug/l	ND (1.8)	ND (0.71)	-	ND (0.69)	-	ND (1.8)	ND (0.79)	-	ND (0.69)	-	ND (1.8)	ND (0.69)	-	ND (0.70)	-	ND (1.8)	ND (0.69)	-	ND (0.70)	-	ND (1.8)	ND (0.72)	-	ND (0.69)	-	ND (2.1)	ND (1.8)	-	NS
2-Nitroaniline	ug/l	ND (2.2)	ND (0.49)	-	ND (0.48)	-	ND (2.2)	ND (0.55)	-	ND (0.48)	-	ND (2.2)	ND (0.48)	-	ND (0.49)	-	ND (2.2)	ND (0.48)	-	ND (0.49)	-	ND (2.2)	ND (0.50)	-	ND (0.48)	-	ND (2.6)	ND (2.2)	-	NS
3-Nitroaniline	ug/l	ND (1.8)	ND (0.58)	-	ND (0.56)	-	ND (1.8)	ND (0.65)	-	ND (0.56)	-	ND (1.8)	ND (0.57)	-	ND (0.57)	-	ND (1.8)	ND (0.56)	-	ND (0.57)	-	ND (1.8)	ND (0.59)	-	ND (0.57)	-	ND (2.1)	ND (1.8)	-	NS
4-Nitroaniline	ug/l	ND (1.5)	ND (0.55)	-	ND (0.53)	-	ND (1.5)	ND (0.62)	-	ND (0.53)	-	ND (1.5)	ND (0.54)	-	ND (0.54)	-	ND (1.5)	ND (0.54)	-	ND (0.54)	-	ND (1.5)	ND (0.56)	-	ND (0.54)	-	ND (1.8)	ND (1.5)	-	NS
Naphthalene	ug/l	ND (1.0)	ND (0.75)	-	ND (0.73)	-	ND (1.0)	ND (0.85)	-	ND (0.73)	-	ND (1.0)	ND (0.74)	-	ND (0.75)	-	ND (1.0)	ND (0.74)	-	ND (0.75)	-	ND (1.0)	ND (0.77)	-	ND (0.74)	-	ND (1.2)	ND (1.0)	-	140
Nitrobenzene	ug/l	ND (1.0)	ND (0.68)	-	ND (0.66)	-	ND (1.0)	ND (0.76)	-	ND (0.66)	-	ND (1.0)	ND (0.66)	-	ND (0.67)	-	ND (1.0)	ND (0.66)	-	ND (0.67)	-	ND (1.0)	ND (0.69)	-	ND (0.66)	-	ND (1.2)	ND (1.0)	-	3.5
N-Nitroso-di-n-propylamine	ug/l	ND (1.6)	ND (0.68)	-	ND (0.66)	-	ND (1.6)	ND (0.76)	-	ND (0.66)	-	ND (1.6)	ND (0.66)	-	ND (0.67)	-	ND (1.6)	ND (0.66)	-	ND (0.67)	-	ND (1.6)	ND (0.69)	-	ND (0.66)	-	ND (1.9)	ND (1.6)	-	0.005

Client Sample ID:		G-01 Milk Ck					G-02 Dever Ck					G-06 Hubbard Ck					G-07 West Muddy Ck					G-08 East Muddy Ck					Sample Blank	Cooler Blank	Sample Blank	Colorado Water Supply Standard [1]
Date Sampled:	Units	1/19/2011	7/26/2011	7/26/2011	11/21/2011	11/21/2011	1/19/2011	7/26/2011	7/26/2011	11/21/2011	11/21/2011	1/19/2011	7/26/2011	7/26/2011	11/21/2011	11/21/2011	1/19/2011	7/26/2011	7/26/2011	11/21/2011	11/21/2011	1/19/2011	7/26/2011	7/26/2011	11/21/2011	11/21/2011	1/19/2011	1/19/2011	7/26/2011	
N-Nitrosodiphenylamine	ug/l	ND (1.0)	ND (0.49)	-	ND (0.48)	-	ND (1.0)	ND (0.55)	-	ND (0.48)	-	ND (1.0)	ND (0.48)	-	ND (0.49)	-	ND (1.0)	ND (0.48)	-	ND (0.49)	-	ND (1.0)	ND (0.50)	-	ND (0.48)	-	ND (1.2)	ND (1.0)	-	7.1
Phenanthrene	ug/l	ND (2.0)	ND (0.49)	-	ND (0.48)	-	ND (2.0)	ND (0.55)	-	ND (0.48)	-	ND (2.0)	ND (0.48)	-	ND (0.49)	-	ND (2.0)	ND (0.48)	-	ND (0.49)	-	ND (2.0)	ND (0.50)	-	ND (0.48)	-	ND (2.4)	ND (2.0)	-	NS
Pyrene	ug/l	ND (1.0)	ND (0.49)	-	ND (0.48)	-	ND (1.0)	ND (0.55)	-	ND (0.48)	-	ND (1.0)	ND (0.48)	-	ND (0.49)	-	ND (1.0)	ND (0.48)	-	ND (0.49)	-	ND (1.0)	ND (0.50)	-	ND (0.48)	-	ND (1.2)	ND (1.0)	-	210
1,2,4-Trichlorobenzene	ug/l	ND (1.8)	ND (0.85)	-	ND (0.83)	-	ND (1.8)	ND (0.96)	-	ND (0.83)	-	ND (1.8)	ND (0.84)	-	ND (0.84)	-	ND (1.8)	ND (0.83)	-	ND (0.84)	-	ND (1.8)	ND (0.87)	-	ND (0.84)	-	ND (2.1)	ND (1.8)	-	70
Metals Analysis																														
			Total	Dissolved	Total	Dissolved		Total	Dissolved	Total	Dissolved		Total	Dissolved	Total	Dissolved		Total	Dissolved	Total	Dissolved		Total	Dissolved	Total	Dissolved				
Arsenic, Total	ug/l	<25	<25	-	<25	-	<25	<25	-	<25	-	<25	<25	-	<25	-	<25	<25	-	<25	-	<25	<25	-	<25	-	<25	-	-	10 (30-day)
Barium, Total	ug/l	31.7	28.5	-	25	-	51	79.4	-	62.7	-	53.1	89.2	-	57.4	-	175	186	-	184	-	164	131	-	142	-	30.6	-	-	490 (30-day)
Cadmium, Diss	ug/l	<10	-	<10	-	<10	<10	-	<10	-	<10	<10	-	<10	-	<10	<10	-	<10	-	<10	<10	-	<10	-	<10	<10	-	-	5 (1-day)
Calcium, Diss	ug/l	19000	-	13600	-	14600	63600	-	70500	-	84600	27700	-	38300	-	27000	58800	-	50900	-	58600	41100	-	31000	-	36200	18800	-	-	NS
Iron, Total	ug/l	131	183	-	125	-	186	1340	-	101	-	149	426	-	276	-	<70	<70	-	78.6	-	337	531	-	143	-	130	-	-	NS
Magnesium, Diss	ug/l	7480	-	4810	-	5590	35700	-	36400	-	54200	7170	-	10200	-	7240	9810	-	9710	-	10300	6390	-	4490	-	5770	7410	-	-	NS
Manganese, Total	ug/l	<5.0	13.8	-	5.8	-	29.5	73	-	33	-	7	20.7	-	19.6	-	20.8	10.9	-	13.5	-	81.8	47.8	-	31.1	-	<5.0	-	-	NS
Potassium, Diss	ug/l	1480	-	1290	-	1460	3750	-	4130	-	5810	1360	-	1910	-	1370	1120	-	1350	-	1240	<1000	-	<1000	-	<1000	1470	-	-	NS
Sodium, Diss	ug/l	4030	-	2790	-	3240	31900	-	32500	-	50000	18000	-	32400	-	17500	11200	-	10500	-	10100	11500	-	7420	-	9140	4040	-	-	NS
Strontium, Tot	ug/l	121	92	-	98.9	-	523	600	-	768	-	237	382	-	244	-	453	484	-	474	-	382	295	-	342	-	121	-	-	NS
Zinc, Diss	ug/l	<30	-	<30	-	<30	<30	-	<30	-	<30	<30	-	<30	-	<30	<30	-	<30	-	<30	<30	-	<30	-	<30	<30	-	-	NS
General Chemistry																														
Bicarbonate as HCO3	mg/l	98.6	73.6	-	78.5	-	299	341	-	441	-	141	185	-	135	-	239	204	-	240	-	168	130	-	152	-	97.8	-	-	NS
Carbonate as CO3	mg/l	<5.0	<5.0	-	<5.0	-	<5.0	<5.0	-	<5.0	-	<5.0	5.3	-	<5.0	-	<5.0	7.2	-	<5.0	-	<5.0	<5.0	-	<5.0	-	<5.0	-	-	NS
Chloride	mg/l	1.1	<0.50	-	0.82	-	7.4	7.2	-	10.8	-	2.1	2.9	-	1.9	-	2.8	2.1	-	2.5	-	4	1.6	-	2.5	-	1.1	-	<0.50	250 (30-day)
Nitrogen, Nitrate	mg/l	0.15	<0.045	-	<0.045	-	0.32	1.2	-	0.68	-	<0.090 [a]	<0.045	-	<0.045	-	<0.090 [a]	<0.045	-	<0.045	-	0.094	<0.045	-	<0.045	-	0.15	-	<0.045	10 (1-day)
Nitrogen, Nitrate + Nitrite	mg/l	0.15 [b]	<0.11 [a]	-	<0.11 [b]	-	<0.54 [b]	1.2 [a]	-	0.68 [b]	-	<0.21 [b]	<0.11 [a]	-	<0.11 [b]	-	<0.21 [b]	<0.11 [a]	-	<0.11 [b]	-	<0.11 [b]	<0.11 [a]	-	<0.11 [b]	-	0.15 [b]	-	<0.11 [a]	-
Nitrogen, Nitrite	mg/l	<0.061	<0.061	-	<0.061	-	<0.31 [a]	<0.061	-	<0.061	-	<0.12 [a]	<0.061	-	<0.061	-	<0.12 [a]	<0.061	-	<0.061	-	<0.061	<0.061	-	<0.061	-	<0.061	-	<0.061	1 (1-day)
Phosphorus, Total	mg/l	<0.10	<0.10	-	0.016	-	<0.10	0.17	-	0.035	-	<0.10	<0.10	-	<0.010	-	<0.10	<0.10	-	<0.010	-	<0.10	<0.10	-	<0.010	-	<0.10	-	<0.10	NS
Solids, Total Dissolved	mg/l	106	100	-	92	-	410	480	-	612	-	190	250	-	162	-	248	212	-	232	-	178	136	-	152	-	134	-	<10	NS
Solids, Total Suspended	mg/l	<5.0	5	-	<5.0	-	5	36	-	<5.0	-	<5.0	13	-	<5.0	-	11	<5.0	-	8	-	116	47	-	<5.0	-	<5.0	-	<5.0	NS
Sulfate	mg/l	4.1	1.8	-	3.3	-	99.5	108	-	155	-	18.7	33.2	-	17.5	-	8.1	5	-	6.2	-	6	3.2	-	4.6	-	4.1	-	<0.50	250 (30-day)
Field Parameters																														
Flow	cfs	frozen	5.3		2.1		na	2.39		2.23		19.6	2.71		3.4		33.4	12.84		9.67		57.3	50.1		57.8					-
Temperature	Deg C	1	14		2		0	17		4		3	19		2		2	18		0		1	9		1					NS
pH	s.u.	8.34	8.42		8.21		8.56	8.59		8.7		8.43	8.35		8.33		8.54	8.66		8.52		8.47	8.47		8.46					6.5 - 9
Specific conductance	uS/cm	167	129		134		665	726		919		264	396		250		379	351		375		280	227		249					NS

Footnotes:

[a] Elevated detection limit due to matrix interference

[b] Calculated as: (Nitrogen, Nitrate) + (Nitrogen, Nitrite)

ND = not detected above the reporting limit

J = estimated value, below the lower quantitation limit

< indicates value less than the detection limit (e.g., if <5, then 5 is the detection limit, and the sample concentration was less than 5)
NS = no surface water supply standard
[1] Some parameters also have water+fish and/or fish ingestion human health based standards, agricultural standards, and/or aquatic life based standards that are not listed in this table (see CDPHE WQCC Regulation No. 31 (5 CCR 1003-31): The Basic Standards and Methodologies for Surface Water

Table 2. Spring Sampling Results

Client Sample ID:		H-01	H-01	H-02	H-02	H-03	H-03	H-04	Colorado Ground Water Standard
Lab Sample ID:		Cave Spring	Cave Spring	Belknap Spring	Belknap Spring	Domestic Pipeline Spring	Domestic Pipeline Spring	Sample Blank	
Date Sampled:		7/26/2011	7/26/2011	7/26/2011	7/26/2011	7/26/2011	7/26/2011	7/26/2011	
		unfiltered	filtered	unfiltered	filtered	unfiltered	filtered	ground water	
GC/MS Volatiles (SW846 8260B)									
Acetone	ug/l	ND (5.0)	-	ND (5.0)	-	ND (5.0)	-	ND (5.0)	NS
Benzene	ug/l	ND (0.25)	-	ND (0.25)	-	ND (0.25)	-	ND (0.25)	5
Bromodichloromethane	ug/l	ND (0.50)	-	ND (0.50)	-	ND (0.50)	-	ND (0.50)	0.56
Bromoform	ug/l	ND (0.50)	-	ND (0.50)	-	ND (0.50)	-	ND (0.50)	4
Chlorobenzene	ug/l	ND (0.50)	-	ND (0.50)	-	ND (0.50)	-	ND (0.50)	100
Chloroethane	ug/l	ND (0.50)	-	ND (0.50)	-	ND (0.50)	-	ND (0.50)	NS
Chloroform	ug/l	ND (0.50)	-	ND (0.50)	-	ND (0.50)	-	ND (0.50)	3.5
2-Chloroethyl vinyl ether	ug/l	ND (5.0)	-	ND (5.0)	-	ND (5.0)	-	ND (5.0)	NS
Carbon disulfide	ug/l	ND (1.4)	-	ND (1.4)	-	ND (1.4)	-	ND (1.4)	NS
Carbon tetrachloride	ug/l	ND (0.50)	-	ND (0.50)	-	ND (0.50)	-	ND (0.50)	5
1,1-Dichloroethane	ug/l	ND (0.50)	-	ND (0.50)	-	ND (0.50)	-	ND (0.50)	NS
1,1-Dichloroethylene	ug/l	ND (0.77)	-	ND (0.77)	-	ND (0.77)	-	ND (0.77)	7
1,2-Dichloroethane	ug/l	ND (0.50)	-	ND (0.50)	-	ND (0.50)	-	ND (0.50)	5
1,2-Dichloropropane	ug/l	ND (0.50)	-	ND (0.50)	-	ND (0.50)	-	ND (0.50)	5
Dibromochloromethane	ug/l	ND (0.50)	-	ND (0.50)	-	ND (0.50)	-	ND (0.50)	14
cis-1,2-Dichloroethylene	ug/l	ND (0.32)	-	ND (0.32)	-	ND (0.32)	-	ND (0.32)	70
cis-1,3-Dichloropropene	ug/l	ND (0.50)	-	ND (0.50)	-	ND (0.50)	-	ND (0.50)	NS
m-Dichlorobenzene	ug/l	ND (0.50)	-	ND (0.50)	-	ND (0.50)	-	ND (0.50)	NS
o-Dichlorobenzene	ug/l	ND (0.54)	-	ND (0.54)	-	ND (0.54)	-	ND (0.54)	NS
p-Dichlorobenzene	ug/l	ND (0.50)	-	ND (0.50)	-	ND (0.50)	-	ND (0.50)	NS
trans-1,2-Dichloroethylene	ug/l	ND (0.90)	-	ND (0.90)	-	ND (0.90)	-	ND (0.90)	100
trans-1,3-Dichloropropene	ug/l	ND (0.50)	-	ND (0.50)	-	ND (0.50)	-	ND (0.50)	NS
Ethylbenzene	ug/l	ND (0.50)	-	ND (0.50)	-	ND (0.50)	-	ND (0.50)	700
2-Hexanone	ug/l	ND (0.50)	-	ND (0.50)	-	ND (0.50)	-	ND (0.50)	NS
4-Methyl-2-pentanone	ug/l	ND (2.5)	-	ND (2.5)	-	ND (2.5)	-	ND (2.5)	NS
Methyl bromide	ug/l	ND (2.9)	-	ND (2.9)	-	ND (2.9)	-	ND (2.9)	NS
Methyl chloride	ug/l	ND (0.58)	-	ND (0.58)	-	ND (0.58)	-	ND (0.58)	NS
Methylene chloride	ug/l	ND (2.5)	-	ND (2.5)	-	ND (2.5)	-	ND (2.5)	5
Methyl ethyl ketone	ug/l	ND (2.5)	-	ND (2.5)	-	ND (2.5)	-	ND (2.5)	NS
Styrene	ug/l	ND (0.50)	-	ND (0.50)	-	ND (0.50)	-	ND (0.50)	100
1,1,1-Trichloroethane	ug/l	ND (0.50)	-	ND (0.50)	-	ND (0.50)	-	ND (0.50)	200
1,1,2,2-Tetrachloroethane	ug/l	ND (0.50)	-	ND (0.50)	-	ND (0.50)	-	ND (0.50)	0.18
1,1,2-Trichloroethane	ug/l	ND (0.50)	-	ND (0.50)	-	ND (0.50)	-	ND (0.50)	5
Tetrachloroethylene	ug/l	ND (0.50)	-	ND (0.50)	-	ND (0.50)	-	ND (0.50)	5
Toluene	ug/l	ND (1.0)	-	ND (1.0)	-	ND (1.0)	-	ND (1.0)	1,000
Trichloroethylene	ug/l	ND (0.50)	-	ND (0.50)	-	ND (0.50)	-	ND (0.50)	5
Vinyl chloride	ug/l	ND (0.75)	-	ND (0.75)	-	ND (0.75)	-	ND (0.75)	2
Vinyl Acetate	ug/l	ND (2.5)	-	ND (2.5)	-	ND (2.5)	-	ND (2.5)	NS
Xylene (total)	ug/l	ND (2.0)	-	ND (2.0)	-	ND (2.0)	-	ND (2.0)	10,000
GC/MS Semi-volatiles (SW846 8270C)									
Benzoic Acid	ug/l	ND (7.1)	-	ND (7.1)	-	ND (7.1)	-	-	NS
2-Chlorophenol	ug/l	ND (0.55)	-	ND (0.55)	-	ND (0.55)	-	-	35
4-Chloro-3-methyl phenol	ug/l	ND (0.48)	-	ND (0.47)	-	ND (0.48)	-	-	210
2,4-Dichlorophenol	ug/l	ND (0.50)	-	ND (0.49)	-	ND (0.50)	-	-	21
2,4-Dimethylphenol	ug/l	ND (0.81)	-	ND (0.81)	-	ND (0.81)	-	-	140
2,4-Dinitrophenol	ug/l	ND (3.8)	-	ND (3.8)	-	ND (3.8)	-	-	14
4,6-Dinitro-o-cresol	ug/l	ND (4.8)	-	ND (4.7)	-	ND (4.8)	-	-	0.27
2-Methylphenol	ug/l	ND (0.52)	-	ND (0.52)	-	ND (0.52)	-	-	NS
4-Methylphenol	ug/l	ND (0.49)	-	ND (0.48)	-	ND (0.49)	-	-	NS
2-Nitrophenol	ug/l	ND (0.53)	-	ND (0.53)	-	ND (0.53)	-	-	NS
4-Nitrophenol	ug/l	ND (2.9)	-	ND (2.8)	-	ND (2.9)	-	-	56
Pentachlorophenol	ug/l	ND (0.67)	-	ND (0.66)	-	ND (0.67)	-	-	1
Phenol	ug/l	ND (0.48)	-	ND (0.47)	-	ND (0.48)	-	-	2,100
2,4,5-Trichlorophenol	ug/l	ND (0.74)	-	ND (0.74)	-	ND (0.74)	-	-	700
2,4,6-Trichlorophenol	ug/l	ND (0.56)	-	ND (0.56)	-	ND (0.56)	-	-	3.2
Acenaphthene	ug/l	ND (0.60)	-	ND (0.60)	-	ND (0.60)	-	-	420
Acenaphthylene	ug/l	ND (0.60)	-	ND (0.60)	-	ND (0.60)	-	-	NS
Anthracene	ug/l	ND (0.48)	-	ND (0.47)	-	ND (0.48)	-	-	2,100
Benzo(a)anthracene	ug/l	ND (0.48)	-	ND (0.47)	-	ND (0.48)	-	-	0.0048
Benzo(a)pyrene	ug/l	ND (0.48)	-	ND (0.47)	-	ND (0.48)	-	-	0.2
Benzo(b)fluoranthene	ug/l	ND (0.48)	-	ND (0.47)	-	ND (0.48)	-	-	0.0048
Benzo(g,h,i)perylene	ug/l	ND (0.54)	-	ND (0.54)	-	ND (0.54)	-	-	NS
Benzo(k)fluoranthene	ug/l	ND (0.48)	-	ND (0.47)	-	ND (0.48)	-	-	0.0048
4-Bromophenyl phenyl ether	ug/l	ND (0.48)	-	ND (0.47)	-	ND (0.48)	-	-	NS
Butyl benzyl phthalate	ug/l	ND (0.48)	-	ND (0.47)	-	ND (0.48)	-	-	1,400
Benzyl Alcohol	ug/l	ND (0.61)	-	ND (0.61)	-	ND (0.61)	-	-	NS
2-Chloronaphthalene	ug/l	ND (0.63)	-	ND (0.63)	-	ND (0.63)	-	-	NS
4-Chloroaniline	ug/l	ND (0.49)	-	ND (0.48)	-	ND (0.49)	-	-	NS
Chrysene	ug/l	ND (0.48)	-	ND (0.47)	-	ND (0.48)	-	-	0.0048
bis(2-Chloroethoxy)methane	ug/l	ND (0.66)	-	ND (0.65)	-	ND (0.66)	-	-	NS

Client Sample ID:		H-01	H-01	H-02	H-02	H-03	H-03	H-04	Colorado Ground Water Standard
Lab Sample ID:		Cave Spring	Cave Spring	Belknap Spring	Belknap Spring	Domestic Pipeline Spring	Domestic Pipeline Spring	Sample Blank	
Date Sampled:		7/26/2011	7/26/2011	7/26/2011	7/26/2011	7/26/2011	7/26/2011	7/26/2011	
bis(2-Chloroethyl)ether	ug/l	ND (0.69)	-	ND (0.68)	-	ND (0.69)	-	-	NS
bis(2-Chloroisopropyl)ether	ug/l	ND (0.64)	-	ND (0.64)	-	ND (0.64)	-	-	280
4-Chlorophenyl phenyl ether	ug/l	ND (0.53)	-	ND (0.53)	-	ND (0.53)	-	-	NS
1,2-Dichlorobenzene	ug/l	ND (0.70)	-	ND (0.70)	-	ND (0.70)	-	-	600
1,3-Dichlorobenzene	ug/l	ND (0.86)	-	ND (0.85)	-	ND (0.86)	-	-	94
1,4-Dichlorobenzene	ug/l	ND (0.72)	-	ND (0.72)	-	ND (0.72)	-	-	75
2,4-Dinitrotoluene	ug/l	ND (0.48)	-	ND (0.47)	-	ND (0.48)	-	-	0.11
2,6-Dinitrotoluene	ug/l	ND (0.48)	-	ND (0.47)	-	ND (0.48)	-	-	NS
3,3'-Dichlorobenzidine	ug/l	ND (0.58)	-	ND (0.58)	-	ND (0.58)	-	-	NS
Dibenzo(a,h)anthracene	ug/l	ND (0.78)	-	ND (0.78)	-	ND (0.78)	-	-	0.0048
Dibenzofuran	ug/l	ND (0.55)	-	ND (0.55)	-	ND (0.55)	-	-	NS
Di-n-butyl phthalate	ug/l	ND (0.50)	-	ND (0.49)	-	ND (0.50)	-	-	700
Di-n-octyl phthalate	ug/l	ND (0.50)	-	ND (0.49)	-	ND (0.50)	-	-	NS
Diethyl phthalate	ug/l	ND (0.48)	-	ND (0.47)	-	ND (0.48)	-	-	5,600
Dimethyl phthalate	ug/l	ND (0.48)	-	ND (0.47)	-	ND (0.48)	-	-	NS
bis(2-Ethylhexyl)phthalate	ug/l	1.0 J	-	0.92 J	-	ND (0.67)	-	-	6
Fluoranthene	ug/l	ND (0.71)	-	ND (0.71)	-	ND (0.71)	-	-	280
Fluorene	ug/l	ND (0.55)	-	ND (0.55)	-	ND (0.55)	-	-	280
Hexachlorobenzene	ug/l	ND (0.48)	-	ND (0.47)	-	ND (0.48)	-	-	1
Hexachlorobutadiene	ug/l	ND (0.76)	-	ND (0.76)	-	ND (0.76)	-	-	0.45
Hexachlorocyclopentadiene	ug/l	ND (4.8)	-	ND (4.7)	-	ND (4.8)	-	-	50
Hexachloroethane	ug/l	ND (0.95)	-	ND (0.95)	-	ND (0.95)	-	-	0.7
Indeno(1,2,3-cd)pyrene	ug/l	ND (1.6)	-	ND (1.5)	-	ND (1.6)	-	-	0.0048
Isophorone	ug/l	ND (0.58)	-	ND (0.58)	-	ND (0.58)	-	-	140
2-Methylnaphthalene	ug/l	ND (0.69)	-	ND (0.68)	-	ND (0.69)	-	-	NS
2-Nitroaniline	ug/l	ND (0.48)	-	ND (0.47)	-	ND (0.48)	-	-	NS
3-Nitroaniline	ug/l	ND (0.56)	-	ND (0.56)	-	ND (0.56)	-	-	NS
4-Nitroaniline	ug/l	ND (0.53)	-	ND (0.53)	-	ND (0.53)	-	-	NS
Naphthalene	ug/l	ND (0.73)	-	ND (0.73)	-	ND (0.73)	-	-	140
Nitrobenzene	ug/l	ND (0.66)	-	ND (0.65)	-	ND (0.66)	-	-	3.5
N-Nitroso-di-n-propylamine	ug/l	ND (0.66)	-	ND (0.65)	-	ND (0.66)	-	-	0.005
N-Nitrosodiphenylamine	ug/l	ND (0.48)	-	ND (0.47)	-	ND (0.48)	-	-	0.0016
Phenanthrene	ug/l	ND (0.48)	-	ND (0.47)	-	ND (0.48)	-	-	NS
Pyrene	ug/l	ND (0.48)	-	ND (0.47)	-	ND (0.48)	-	-	210
1,2,4-Trichlorobenzene	ug/l	ND (0.83)	-	ND (0.82)	-	ND (0.83)	-	-	70
GC Volatiles (RSK175 MOD)									
Methane	mg/l	ND (0.00080)	-	ND (0.00080)	-	ND (0.00080)	-	-	NS
Ethane	mg/l	ND (0.0016)	-	ND (0.0016)	-	ND (0.0016)	-	-	NS
Ethene	mg/l	ND (0.0024)	-	ND (0.0024)	-	ND (0.0024)	-	-	NS
Dissolved Metals Analysis									
Cadmium	ug/l	-	<10	-	<10	-	<10	-	5
Calcium	ug/l	-	61900	-	62700	-	37700	-	NS
Magnesium	ug/l	-	19300	-	39000	-	24500	-	NS
Potassium	ug/l	-	1980	-	1700	-	2500	-	NS
Sodium	ug/l	-	48400	-	41000	-	39000	-	NS
Zinc	ug/l	-	<30	-	<30	-	<30	-	5
General Chemistry									
Bicarbonate as HCO3	mg/l	330	-	351	-	296	-	-	NS
Carbonate as CO3	mg/l	<5.0	-	<5.0	-	<5.0	-	-	NS
Chloride	mg/l	4.6	-	3.1	-	2.3	-	<0.50	250
Nitrogen, Nitrate	mg/l	<0.23 [b]	-	<0.23 [b]	-	0.36	-	<0.045	10
Nitrogen, Nitrate + Nitrite	mg/l	<0.29 [a]	-	<0.29 [a]	-	0.36 [a]	-	<0.11 [a]	10
Nitrogen, Nitrite	mg/l	<0.061	-	<0.061	-	<0.061	-	<0.061	1
Phosphorus, Total	mg/l	<0.10	-	<0.10	-	<0.10	-	<0.10	NS
Solids, Total Dissolved	mg/l	384	-	480	-	332	-	<10	1.25 x background
Solids, Total Suspended	mg/l	<5.0	-	<5.0	-	<5.0	-	<5.0	NS
Sulfate	mg/l	52	-	104	-	28.3	-	<0.50	250
Field Parameters									
Flow	cfs	0.018		na		na			-
Temperature	Deg C	9		14		14			NS
pH	s.u.	7.31		7.5		7.78			6.5 - 8.5
Specific conductance	uS/cm	636		749		532			NS

Footnotes:

[a] Calculated as: (Nitrogen, Nitrate) + (Nitrogen, Nitrite)

[b] Elevated detection limit due to matrix interference.

ND = not detected above the reporting limit

J = estimated value, below the lower quantitation limit

< indicates value less than the detection limit (e.g., if <5, then 5 is the detection limit, and the sample concentration was less than 5)

NS = no ground water standard