

# HALEPASKA AND ASSOCIATES

Project # 2024 #1629302

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Ms. Debbie Baldwin, COGCC – Environmental Manager  
Mr. Chris Canfield, COGCC – Environmental Protection Specialist II Colorado Oil and Gas Conservation Commission  
1120 Lincoln Street, Suite 801  
Denver, Colorado 80203

Subject: Review of Prather Spring Investigation Submittals  
Garfield County, Colorado

Project: 5945

Dear Ms. Baldwin and Mr. Canfield:

## Introduction

### Background

Prather Spring was found to be contaminated on May 30, 2008, by Mr. Ned Prather. While visiting his cabin Mr. Prather drank water from his kitchen faucet, felt a burning sensation in his throat, became ill, and was taken to a hospital. On May 31, 2008, Mr. Prather filed a complaint (Document No. 200190483) with the Colorado Oil and Gas Conservation Commission (COGCC). In response to Mr. Prather's complaint, the COGCC collected water samples from the faucet he drank from, the improved spring (permitted with the State Engineers Office under Permit No. 233234) supplying water to his cabin, and other springs in the area. Benzene, toluene, xylenes, and other volatile organic compounds (VOCs) were detected in the water samples collected from Mr. Prather's spring (Prather Spring) and the kitchen faucet in his cabin.

The COGCC, in response to the discovery of the contamination, issued Notices of Alleged Violation (NOAV) on June 19, 2008, to Williams Production RMT Company (Williams), Petroleum Development Company (PDC), Marathon Oil Company (Marathon), and Nonsuch Natural Gas (Nonsuch). Each of those companies conduct, or have conducted, oil and gas operations in the vicinity of the Prather Spring. On December 18, 2008, the COGCC issued two additional NOAVs to Williams concerning their operations located on the east side of the Prather Spring valley.

In response to the NOAVs, Williams, PDC, Marathon, and Nonsuch formed a group for the purpose of doing a joint investigation of the nature and extent of contamination detected in the Prather Spring. URS Corporation (URS) was retained to manage and interpret the results of the Joint Investigation. Separately, each of those companies

performed investigations focused on their own operations in the area, i.e. the operations subject to the NOAVs.

Field activities began in July 2008 and continued intermittently through October 2008. A variety of tasks were completed, including the installation of monitoring wells, a soil gas survey, an electromagnetic geophysical survey, and collection of soil, groundwater and surface water samples for laboratory analysis.

As a result of the analysis of samples collected as part of the 2008 Joint Investigation, VOCs were discovered in an un-named, unimproved spring located in a valley to the southwest of Mr. Prather's cabin. That spring is identified as Spring 2 in this report as well as all of the submittals to the COGCC. Spring 2 was not originally a subject of the investigation, although as a precautionary measure it was sampled on four occasions following the discovery of contamination in the Prather Spring and prior to the discovery of contamination in it. In response to the detection of the VOCs in Spring 2, the COGCC issued an NOAV to Oxy USA (Oxy) on August 11, 2008, concerning their operations in the vicinity of Spring 2.

On November 12, 2008, John C. Halepaska and Associates (JCHA) was retained by the COGCC to evaluate submittals from the 2008 Joint Investigation and from each of the individual companies, as well as provide technical support to the COGCC during the Prather Spring and Spring 2 investigations. This report presents JCHA's interpretation of the data submitted to, and collected by, the COGCC. Assumptions concerning the location of facilities relative to each other and to site topography are based on topographic maps, aerial photography, information submitted by the companies, and information provided by the COGCC.

### Data Sources

Submittals included in this review include;

- Results of COGCC sampling events, specifically all COGCC sampling through February 2009. The results of the COGCC May 2009 sampling event are being reported under separate cover.
- Results of the 2008 Joint Investigation including,
  - Interim Prather Spring Phase I Site investigation Drilling Report, August 7, 2008.
  - Prather Spring Phase I Site Investigation Report, November 24, 2008.
- Responses to the NOAVs by each of the companies.
- Results of investigations done by each of the companies concerning their unique operations.

## Objectives

The review was undertaken to synthesize information from the above-mentioned sources, interpret it holistically, and to present conclusions and recommendations to the COGCC.

## **Site Characteristics**

### Site Description

The Prather Spring and Spring 2 are located in the Southwest Quarter of Section 14, Township 6 South, Range 97 West of the 6<sup>th</sup> Prime Meridian, in Garfield County, Colorado (Figure 1).

### Site Geology

The site is located in the U.S. Geological Survey (USGS) Circle Dot Gulch Quadrangle Map. The major geologic units were defined in *The Geology of the Roan Plateau Area, Northwestern Colorado* USGS Survey Bulletin 1787-R, William Hail Jr., 1992. Major stratigraphic units in the area of Prather Spring and Spring 2 include Unit D of the Lower Uinta Formation and the Parachute Creek Member of the Upper Green River Formation. The colluvium that is found in the creek drainages is derived from the erosion of the underlying sedimentary rock.

The Uinta D unit consists primarily of fine grained sandstone and siltstone. The unit weathers easily and produces rounded slopes. The underlying Parachute Creek Member is comprised of marly siltstone, silty marlstone, dolomitic marlstone, and oil shale. The Parachute Creek Member is resistant to weathering and forms high, precipitous cliffs and canyon walls. Observation of drill core obtained while drilling monitoring wells indicates that the upper 5 feet of the Parachute Creek Member contains numerous intersecting fractures dipping at a 30 to 40 degree angle. The fracture density decreases with increasing depth below the top of the unit. The fractures in the upper 5 feet of the Parachute Creek Member provide ample secondary permeability allowing for the transport of groundwater through the upper Parachute Creek Member.

Major structural features near the site include the Crystal Creek anticline. The anticline is located to the south west of the site. The Crystal Creek anticline trends to northwest across the southwestern part of the Piceance Basin. Faults and major fracturing have not been reported near the site in the available literature.

## Site Hydrology

The Prather Spring discharges into an un-named tributary of McKay Gulch. Spring 2 discharges directly into McKay Gulch. McKay Gulch in turn drains into Garden Gulch which ultimately discharges into Parachute Creek.

Groundwater movement at the site is most likely controlled by the topography and roughly follows the surface water drainages within the project area. However, the possibility of fracture flow could result in an altered groundwater flow path, but it would still be controlled by gravity.

## **INVESTIGATIONS**

### **2008 Joint Investigation**

#### Soil and Soil Gas Sampling

Field activities began in July 2008 and continued intermittently through October 2008. A variety of tasks were completed including the installation of 44 monitoring wells, a soil gas survey, an electromagnetic geophysical survey, and collection of soil, groundwater and surface water samples for laboratory analysis.

Forty-four boreholes, completed as monitoring wells, were installed. Thirty-two were located in the valley in which the Prather Spring is located. The other 12 are located in the valley in which Spring 2 is located. The work was completed in three separate phases. The boreholes were advanced by using solid stem, hollow stem, and air coring methods. Soil samples were collected via split spoon for laboratory analysis during the drilling of some of the boreholes.

Petroleum hydrocarbons were detected in 13 of the soil samples submitted for laboratory analysis. Hydrocarbon range organics included acetone, benzene, carbon disulfide, methylene chloride, toluene, total xylenes, and gasoline range and diesel range organic compounds. All of the detections were J flagged with the exception of the diesel range organic compounds. The J flag indicated that the value given was estimated. There was no consistent relationship among the hydrocarbons detected in a particular boring nor was there a pattern to the aerial distribution.

A soil gas survey was completed in October 2008. Probe locations were selected based on the interpretation of an electromagnetic survey. Thirty-seven soil gas probes were installed during the survey. A total of 12 probes ranging in depth from 15 to 20 feet below ground surface (bgs) were installed in the Prather Spring valley. Another 15 gas probes ranging in depth from 8 to 14 feet bgs were installed in the Spring 2 valley. Additionally, 10 soil gas probes ranging in depth from 8 to 9 feet bgs were installed in

the areas surrounding two condensate tanks located at the head of the Prather Spring valley.

Trace concentrations of ethyl benzene, toluene, and xylenes were detected in the soil gas samples collected in the initial sampling event. The same constituents were also found in the field and ambient blanks collected contemporaneously with the samples. A second set of samples were collected using different tubing and all those results were below detection. The soil gas survey did not result in the identification of any soil contaminated by volatile organic compounds.

### Surface Water

A total of 381 surface water samples were collected for laboratory analysis. Surface water samples were collected from:

- The Prather Spring
  - A cistern associated with the Prather Spring
  - A surface water station located 440 feet downstream of the Prather Spring
  - Ned Prather's stock pond
  - The outlet from which Ned Prather's stock pond drains
  - A surface water station located 500 feet downstream of Ned Prather's stock pond
  
- Spring 2
  - A surface water station located 100 feet downstream of Spring 2
  - A surface water station located 350 feet downstream of Spring 2

### Prather Spring

VOCs including benzene, ethyl benzene, toluene, xylenes, 1,2,4-trimethylbenzene (1,2,4-TMB), and 1,3,5-trimethylbenzene (1,3,5-TMB) have been detected in water samples collected from the Prather Spring since June 2008. The results for these chemicals of interest are summarized in Table 1.

Benzene concentrations ranged from 100 micrograms per liter ( $\mu\text{g/L}$ ) on June 2, 2008, to 350  $\mu\text{g/L}$  on August 4, 2008. The last 2008 sample, collected on October 29, 2008, had a benzene concentration of 200  $\mu\text{g/L}$  and the sample collected February 13, 2009, had a benzene concentration of 58  $\mu\text{g/L}$ .

Toluene concentrations ranged from 25  $\mu\text{g/L}$  to 1,300  $\mu\text{g/L}$ . The highest concentration was detected in the sample collected on July 17, 2008, and the lowest concentration was detected in a sample collected on October 29, 2008. The toluene concentration in the sample collected on February 13, 2009, was below the 10  $\mu\text{g/L}$  laboratory lower quantitation limit (LQL).

Ethyl benzene concentrations ranged from 3.27 µg/L to 12 µg/L. The concentration detected in the sample collected on October 29, 2008, was reported as less than 11 µg/L and the sample collected February 13, 2009, had a concentration lower than the LQL of 10 µg/L.

Total xylenes concentrations ranged from 1,000 µg/L on June 3, 2008, to 3,000 µg/L on October 8 and 16, 2008. The sample collected on October 29, 2008, had a concentration of 2,800 µg/L and the sample collected February 13, 2009, had a total xylene concentration of 1,000 µg/L.

1,2,4-TMB concentrations ranged from 41 µg/L on June 6, 2008, to 220 µg/L on October 29, 2008. Samples collected on February 13, 2009, were not analyzed for 1,2,4-TMB.

1,3,5-TMB concentrations ranged from 95 µg/L on June 6, 2008, to 230 µg/L on October 29, 2008. Samples collected on February 13, 2009, were not analyzed for 1,3,5-TMB.

Water samples from Prather Spring were analyzed for chloride during all sampling events from June 23, 2008, onward. Water samples were also analyzed for alkalinity (bicarbonate), sodium, calcium, magnesium, sulfate, and total dissolved solids (TDS) intermittently over the course of the investigation. Table 2 presents a summary of these data.

Chloride concentrations ranged from 54.5 milligrams per liter (mg/L) on June 23, 2008, to 118 mg/L on October 23, 2008. Chloride was detected at a concentration of 181 mg/L in the sample collected on February 13, 2009.

Calcium concentrations ranged from 78 mg/L on September 4, 2008, to 110 mg/L on February 13, 2009.

Magnesium concentrations ranged from 33 mg/L on September 4, 2008, to 48 mg/L on February 13, 2009.

Sodium concentrations ranged from 57 mg/L on September 10, 2008, to 88 mg/L on February 13, 2009.

Sulfate concentrations in 2008 ranged from 79.4 mg/L on September 17, 2008, to 86 mg/L on September 10, 2008. Sulfate was detected at a concentration of 33.9 mg/l in the sample collected on February 13, 2009.

Alkalinity as bicarbonate ( $\text{HCO}_3$  in Table 2) ranged from 289 mg/L on August 4, 2008, and September 4, 2008, to 387 mg/L on February 13, 2009, reported as  $\text{CaCO}_3$ .

TDS concentrations in Prather Spring ranged from 356 mg/L on June 23, 2008, to 570 mg/L on September 10, 2008. TDS concentrations were not reported for the samples collected on February 13, 2009.

## Spring 2

VOCs, including benzene, ethyl benzene, toluene, xylenes, 1,2,4-TMB, and 1,3,5-TMB have been detected in water samples collected from Spring 2 since July 2008. The results for these chemicals of interest are summarized in Table 3.

Benzene concentrations ranged from 11 µg/L on July 17, 2008, to 70 µg/L on September 4, 2008. The last 2008 sample, collected on October 29, 2008, had a benzene concentration of 20 µg/L. Benzene was not detected in the sample collected on February 13, 2009.

The only sample collected from Spring 2 with toluene above the detection limit was the sample collected on August 29, 2008, with a concentration of 5.0 µg/L.

Ethyl benzene concentrations ranged from 0.33 µg/L on October 29, 2008, to 5.4 µg/L on August 29, 2008. Ethyl benzene was not detected in the sample collected on February 13, 2009.

Total xylenes concentrations ranged from 4 µg/L on July 24, 2008, to 52 µg/L on September 4, 2008. Total xylenes were detected in the sample collected on October 29, 2008, at a concentration of 13 µg/L. Total xylenes were not detected in the sample collected on February 13, 2009.

1,2,4-TMB concentrations ranged from 1.3 µg/L on September 4, 2008, to 9.8 µg/L on August 29, 2008. 1,2,4-TMB was detected in the final 2008 sample, collected on October 29, 2008, at a concentration of 2.6 µg/L. The sample collected on February 13, 2009 was not analyzed for 1,2,4-TMB.

1,3,5-TMB concentrations ranged from 1.2 µg/L on September 4, 2008, to 9.4 µg/L on August 29, 2008. 1,3,5-TMB was detected in the sample collected on October 29, 2008, at a concentration of 1.29 µg/L. The sample collected on February 13, 2009 was not analyzed for 1,3,5-TMB.

Water samples from Spring 2 were analyzed for chloride during all sampling events. Water samples were also analyzed for alkalinity, sodium, calcium, magnesium, sulfate, and TDS intermittently over the course of the investigation. Table 4 summarizes the results for these constituents in Spring 2.

Chloride ranged from a low of 286 milligrams per liter (mg/L) on July 15, 2008, to a high of 795 mg/L on August 14, 2008. The chloride concentration detected in the sample

collected on October 29, 2008, was 645 mg/L, and was 420 mg/L in the sample collected on February 13, 2009.

Calcium concentrations ranged from 140 mg/L on August 28, 2008, to a high of 220 mg/L on September 10, 2008. The calcium concentration detected in the last 2008 sample, collected on September 17, 2008, was 200 mg/L and was 150 mg/L on February 13, 2009.

Magnesium concentrations ranged from 57 mg/L on August 29, 2008, to a high of 62 mg/L on August 4 and 10, 2008. The magnesium concentration detected in the sample collected on September 17, 2008, was 60 mg/L, and was 50 mg/L on February 13, 2009.

Sodium concentrations ranged from 120 mg/L on August 29, 2008, to a high of 240 mg/L on September 17, 2008. The sodium concentration detected in the sample collected on February 13, 2009, was 110 mg/L

Sulfate concentrations ranged from 2.4J mg/L on September 10, 2008, to 47.3 mg/L on February 13, 2009.

Bicarbonate alkalinity ( $\text{HCO}_3$  on Table 4) concentrations reported as  $\text{CaCO}_3$  ranged from 263 mg/L on August 29, 2008, to 326 mg/L on September 17, 2008. The alkalinity concentration was 231 mg/L on February 13, 2009.

TDS concentrations in Spring 2 ranged from 1310 mg/L on August 29, 2008 to 2000 mg/L September 10, 2008. No TDS concentration was reported for the February 13, 2009 samples.

### Groundwater Monitoring Wells

A total of 44 monitoring wells have been completed at various depths in the Prather Spring and Spring 2 valleys. Samples of groundwater were collected from the wells and analyzed for various organic and inorganic constituents.

#### Prather Spring Valley

This section summarizes the analytical results for samples of groundwater collected from the 32 monitoring wells completed in the valley where the Prather Spring is located. Based on the results of the surface water sampling, the chemicals of interest include benzene, toluene, ethyl benzene, 1,2,4-TMB, 1,3,5-TMB and chloride. The results for these organic chemicals of interest are summarized on Table 5.

Of the monitoring wells in the Prather Spring valley, PS-MW02S did not produce any water and as a result could not be sampled. Organic chemicals of interest were not

detected above the Practical Quantitation Limit (PQL) in monitoring wells PS-MW2D, PS-MW02M, PS-MW03S, PS-MW03D, PS-MW04S, PS-MW11S, PS-MW12M, PS-MW14, PS-MW15, PS-MW16, PS-MW17, PS-MW18, PS-MW-19, PS-MW20, PS-MW21, PS-MW22, PS-MW29, PS-MW31, PS-MW32, PS-MW33, and PS-MW34. The detection limit for the various compounds varied depending on the laboratory used to perform the analysis.

Only the sample collected on September 8, 2008, from monitoring well PS-MW04D and analyzed by PGNC had a detectable concentration of any of the organic chemicals of concern. The concentration detected was 0.17 µg/L, which had a "J" qualifier. A J qualifier means the value reported is above the detection limit, but is below the PQL which is the limit above which the instrument response is statistically significant (typically 10 times the detection limit).

There were three J values reported for samples analyzed from PS-MW05D. They were 0.21J µg/L for ethylbenzene, and 0.80J µg/L and 0.93J µg/L for toluene.

Samples collected from monitoring well PS-MW13D had J values of 0.23J µg/L and 0.33J µg/L reported for toluene.

Monitoring well PS-MW06R had a sample with 0.21 µg/L of toluene and a reported J value of 0.33J µg/L of total xylenes.

Groundwater samples collected for PS-MW11D had benzene concentrations ranging from 0.50 µg/L to 1.21 µg/L and toluene concentrations ranging from 0.77 µg/L to 1.34 µg/L. In addition a value of 0.34J µg/L of total xylenes was reported.

Samples collected from PS-MW11S had reported concentrations of 0.20 µg/L for benzene and 0.27 µg/L for toluene.

The samples collected from PS-MW28 had reported concentrations of 1,2,4-TMB ranging from 3.50J µg/L to 57.0 µg/L; of benzene from 14.0 µg/L to 150 µg/L; of ethyl benzene from not detected to 3.59J µg/L; of toluene from 2.20J µg/L to 21.0 µg/L; and of total xylenes from 95.0 µg/L to 1,200 µg/L. The high PQL for these analyses is the result of using a field laboratory.

The samples collected from PS-MW30 had reported concentrations of benzene ranging from 1.29J µg/L to 2.79J µg/L; of toluene from 1.39J µg/L to 3.20J µg/L; and of total xylenes from 1.60J µg/L to 4.19 µg/L.

Water samples collected from monitoring wells in the Prather Spring valley were analyzed for chloride, alkalinity, sodium, calcium, magnesium, sulfate, and TDS intermittently over the course of the investigation. Generally, monitoring wells PS-MW02D through PSMW-06R and PS-MW11D through PS-MW13 had one sample

collected in September 2008 and one sample collected in October 2008. None of the wells installed after PS-MW13D were sampled for major cations or anions. Table 4 summarizes the results for these constituents in samples collected from monitor wells in the Prather Spring Valley.

Chloride ranged from a low of 4.3 mg/L in monitoring well PS-MW02D to a high of 49.2 mg/L in PS-MW05D. Most of the monitoring wells sampled in the Prather Spring valley had chloride concentrations less than 10 mg/L.

Calcium concentrations ranged from 71 mg/L in PS-MW06R, to a low of 41J mg/L in PS-MW-5D. The calcium concentrations measured in the Prather Spring valley were generally in a narrow range of 50 mg/L to 60 mg/L.

Magnesium concentrations ranged from 12 mg/L in PS-MW05D, to a high of 21J mg/L in PS-MW02D. The magnesium concentration generally ranged between 16 mg/L and 19 mg/L in the Prather Spring valley.

Sodium concentrations ranged from 27 mg/L in PS-MW11S and PS-MW04S, to a high of 100 mg/L in PS-MW05D. The sodium concentrations were generally in the range of 30 mg/L to 45 mg/L.

Sulfate concentrations ranged from 33.5 mg/L in PS-MW11S, to 79.2 mg/L in PS-MW05D. The sulfate concentrations detected in the samples collected in the Prather Spring valley were generally in the range of 45 mg/L to 55 mg/L.

Bicarbonate alkalinity ( $\text{HCO}_3$  in Table 4) concentrations ranged from 209 mg/L in PS-MW11S, to 429 mg/L in PS-MW05D. The alkalinity concentrations measured in the samples collected from monitoring wells in the Prather Spring valley generally were in the range of 220 mg/L to 250 mg/L reported as mg/L  $\text{CaCO}_3$ .

TDS concentrations ranged from 227J mg/L in PSMW-12M to 550 mg/L in PSMW-05D. In general, the TDS in samples collected from the monitoring wells were similar to the concentrations measured in the Prather Spring.

### Spring 2 Valley

This section summarizes the analytical results for samples of groundwater collected from the 12 monitoring wells completed in the Spring 2 valley. Based on the results for samples collected from the monitoring wells and Spring 2, the chemicals of interest include benzene, toluene, ethyl benzene, 1,2,-TMB, 1,3,5-TMB, and chloride. The results for the organic chemicals of interest are summarized on Table 7.

Organic chemicals of interest were not detected in monitoring wells PS-MW07D, PS-MW08S, PS-MW09S, PS-MW10D, PS-MW23, PS-MW-24, PS-MW-25, and PS-MW26.

The detection limit for the various compounds varied depending on the laboratory used to perform the analysis.

The water sample collected from PS-MW8D on October 17, 2008, during the final sample collection event of 2008, had a reported concentration of 1.20 µg/L for benzene. The concentrations of all of the other chemicals of interest for this event and the other sampling events for this monitoring well were below the detection limit. This result suggests that PS-MW8D could be near a flow path carrying VOC's.

The water samples collected from PS-MW10S had reported concentrations of benzene that ranged from 0.37J µg/L to 0.76J µg/L, and toluene that ranged from not detected to 0.12J µg/L.

The water samples collected from PS-MW27 had concentrations of 1,2,4-TMB ranging from not detected to 1.29J µg/L; and of total xylenes ranging from 4.80J to 12.00 µg/L.

Water samples collected from monitoring wells in the Spring 2 valley were analyzed for chloride, alkalinity, sodium, calcium, magnesium, sulfate, and TDS intermittently over the course of the investigation. Generally, monitoring wells PS-MW07D through PS-MW10S had one sample collected in September 2008 and one sample collected in October 2008. None of the wells installed after PS-MW10S were sampled for major cations or anions. Table 8 summarizes the results for these constituents in samples collected from monitor wells in the Spring 2 valley.

Chloride ranged from a low of 6.9 mg/L in monitoring well PS-MW09S to a high of 300 mg/L in PS-MW10S. Most of the monitoring wells sampled in the Spring 2 valley had chloride concentrations in the range 200 mg/L to 300 mg/L.

Calcium concentrations ranged from 50.7 mg/L in PS-MW09S, to high of 140 mg/L in PS-MW07S and PSMW10S. The calcium concentrations detected in samples collected from monitoring wells in the Spring 2 valley were generally in the range of 100 mg/L to 140 mg/L.

Magnesium concentrations ranged from 15.65 mg/L in PS-MW09S to a high of 49 mg/L in PS-MW07S. The magnesium concentrations detected in samples collected from monitoring wells located in the Spring 2 valley generally ranged between 30 mg/L and 49 mg/L.

Sodium concentrations ranged from 26 mg/L in PS-MW09S to a high of 252.2 mg/L in PS-MW08D. The sodium concentrations detected in samples collected from monitoring wells in the Spring 2 valley were generally in the range of 60 mg/L to 80 mg/L.

Sulfate concentrations ranged from 32 mg/L in PS-MW09S to 190 mg/L in PS-MW07D. The sulfate concentrations detected in the samples collected from monitoring wells in the Spring 2 valley were generally in the range of 60 mg/L to 70 mg/L.

Bicarbonate alkalinity, reported as  $\text{CaCO}_3$ , concentrations, ranged from 200 mg/L in PS-MW07S, to 322 mg/L in PS-MW08S. The alkalinity concentrations measured in the samples collected from monitoring wells in the Spring 2 valley generally were in the range of 220 mg/L to 250 mg/L.

TDS concentrations ranged from 265J mg/L in PS-MW9S to 1130 mg/L in PS-MW8D. The concentrations of TDS measured in the monitoring wells was lower than in Spring 2 indicating that the flow path providing the higher TDS to Spring 2 was not intersected by the existing monitoring wells.

### **Investigation of Potential Sources**

Each of the four companies involved with the Joint Investigation (Williams, PDC, Marathon, and Nonsuch) and OXY investigated potential sources associated with their operations near both the Prather Spring and Spring 2. Those investigations generally included collecting soil and soil gas samples for laboratory analysis. When water was encountered in the subsurface, it was sampled for laboratory analysis.

#### **Nonsuch Pad 697-14 Investigation**

Historically, produced water was stored in a now closed pit on the site. Nonsuch reports that the water would develop a thin film of floating condensate. Because the well at this location produced small quantities of water, the volume of water in the pit was always less than the pit's capacity. Nonsuch skimmed the condensate from the pond in June 2008 and placed it into an onsite tank.

In August 2008, Cordilleran Compliance Services, Inc. (Cordilleran), on behalf of Nonsuch, completed a soil gas survey at Nonsuch Pad 697-14. Pad 697-14 is located approximately 500 feet to the west of Prather Spring and approximately 800 feet to the southeast of Spring 2 (Figure 1). Work at the site began on August 26, 2008, and was completed on August 27, 2008.

The purpose of the soil vapor survey was to evaluate the presence of BTEX and other compounds related to natural gas production taking place at the pad. Cordilleran began the site investigation by laying out a grid system over the location of the former production pit. This pit had been closed and reclaimed in June 2008 and subsequently replaced with a smaller production pit.

Eleven holes were advanced. Depths of the holes varied from 2 to 16 feet bgs due to the lithology encountered during drilling. Water was encountered in one of those borings (NSP - D-10).

Once the boreholes had been advanced to target depths the drill rods were retracted approximately 6 inches to open a collection port. Polyethylene tubing was inserted into the drill rods and threaded into a sampling tip in order to isolate the target interval from the rest of the borehole. Prior to sample collection, the boreholes were purged for ten minutes using a peristaltic pump. During evacuation, the pump outflow was monitored using both a flame ionizing detector (FID) and a photo ionizing detector (PID). After purging the borehole, samples were collected in 1-liter tedlar bags for laboratory analysis.

Seven soil vapor samples were collected from the 11 boreholes. The soil vapor samples were taken to ChemSolutions mobile laboratory on August 27, 2008, for analysis of volatile organic compounds by Method 8260B.

BTEX compounds were detected in five of the seven samples submitted to ChemSolutions. Detectable concentrations of BTEX compounds were found in boreholes NSP-D10-16, NSP-D10-10, NSP-B5-16, NSP-10.5-10 and NSP-A15-12.

A water sample was collected from boring NSP-D10 on August 28, 2008. The sample was then transported to ChemSolutions mobile laboratory for chemical analysis. Benzene was detected at a concentration of 29 µg/L; ethylbenzene was detected at a concentration of 5.8 µg/L; total xylenes were detected at a concentration of 34 µg/L; 1,3,5-trimethylbenzene was detected at a concentration of 17 µg/L; 1,2,4-trimethylbenzene was detected at concentration of 32 µg/L; and, naphthalene was detected at a concentration of 13 µg/L.

Six additional soil borings were installed at the site. A water sample collected from SB03 had a benzene concentration of 17.4 µg/L, an ethylbenzene concentration of 21.7 µg/L, an ortho xylene concentration of 8.89 µg/L, and a meta+para xylene concentration of 31.5 µg/L. A water sample collected from boring SB04 contained 44.30 µg/L benzene, 58 µg/L toluene, 3.65 µg/L ethylbenzene, 8.54 µg/L ortho xylene, and 25.50 µg/L of meta+para xylene. Two soil samples had measurable concentrations of TPH, SB01-17 at 784.75 mg/kg, and SB03-16.5 at 359.04 mg/kg.

#### Williams MV1-23 Pad Investigation

The Williams MV 1-23 Pad is located approximately 1,400 feet south of the Prather Spring and 2,000 feet southeast of Spring 2. The well on that pad has been shut in since 1999. Williams contracted Environmental, Audit and Assessment Inc. (EAA) to perform soil sampling and to conduct a soil vapor survey to determine whether BTEX or other hydrocarbon contamination was present at the pad. Five soil samples and ten

vapor samples were collected from the MV 1-23 Pad and analyzed for VOCs. VOCs were not detected in the soil and vapor samples collected by EAA. Groundwater was not encountered during the investigation.

#### Williams WGV Pad Investigation

The Williams WGV Pad is located approximately 1,600 feet southeast of the Prather Spring. It is outside of the area supplying water to Spring 2. The pad was built in 2007 for the purpose of drilling two natural gas wells. A lined drilling pit and a lined production pit were constructed on the pad.

Field screening of an open pipeline trench north (between the pad and the Prather Spring) of the WGV Pad was performed using a Photo Ionization Detector (PID). The bottom of the pipeline trench was estimated to be 25 feet below the elevation of the WGV Pad and penetrated the contact between the colluvium and the weathered bedrock. All PID readings were below the detection limit of the instrument. No evidence of hydrocarbon staining or groundwater was observed during the screening.

Four boreholes were drilled northwest of the WGV Pad downgradient of the WGV Pad between it and the Prather Spring to depths ranging from 8 feet to 10 feet bgs. Soil samples collected from these boreholes were tested for VOC's. VOC's were not detected in any of the four soil samples.

#### Marathon/PDC Pad 23X Investigation

Pad 23X is located 1,000 feet south of the Prather Spring and 1,500 feet to the southeast of Spring 2. Neither of the two gas wells on the pad has been put into production. According to information provided by Marathon, the wells have been hydraulically fractured, but have not yet been flowed back.

During June 2008, two diesel spills were found to have occurred on the site. Those spills were remediated during June 2008. Approximately 2,422 tons of soil and bedrock were removed from the pad and disposed offsite. Based on review of the environmental remediation and verification data, the Hazardous Materials and Waste Management Division of the Colorado Department of Public Health and Environment (CDPHE) has determined that no further action is required with regard to remedial excavation at Pad 23X (relative to the diesel release) to assure that it is protective of existing and proposed uses.

During August 2008, an investigation of a former mud reserve pit was completed by Golder and Associates on behalf of Marathon. As part of the investigation, three test pits were dug. Twelve samples were collected and field screened using a PID. The three samples with the highest PID readings were submitted for laboratory analysis. Low levels of diesel range organic compounds were found.

Thirty-one soil vapor probes were installed on the 23X Pad. Significant VOC concentrations were not detected in any at any of those locations.

Six soil borings were installed over the course of the investigation. Water was not encountered in any of the borings. The deepest boring was borehole B-6 at a depth of 60 feet bgs. Soil samples were collected and screened at 5 foot intervals during the drilling of each borehole. The soil samples with the highest PID readings were submitted for laboratory analysis. Thirty-three samples were submitted for analysis.

Laboratory analyses detected low VOC concentrations in some of the soil samples. Benzene was not detected in any of the 33 samples. Toluene was detected in two samples at concentrations between 10 µg/kg and 13 µg/kg, ethyl benzene was detected in two samples at between 14 µg/kg and 22 µg/kg and total xylenes were found in six samples at concentrations between 111 µg/kg and 171 µg/kg. TPH concentrations ranged from 36 mg/kg to 705 mg/kg.

#### OXY Pad 697-15-54 Investigation

The OXY 697-15-54 pad is located approximately 2,600 feet to the west of Spring 2 (Figure 1). It is outside of the area supplying water to the Prather Spring. Walsh Environmental Scientists and Engineers, LLC (Walsh) conducted an investigation at that pad in response to an NOAV from the COGCC dated August 11, 2008. Work at the site began on August 13, 2008, and continued through October 23, 2008.

The activities completed by Walsh focused on a former unlined drilling pit and a lined production pit on the pad. The unlined drilling pit was constructed in 2005 and used to manage water-based drilling fluids during the drilling of the OXY Cascade Creek 15-54 well. Once drilling was completed the unlined pit was used for completion activities and then as a production pit until 2008. At this time it is unclear exactly how much fluid was placed in the pit over the four years of operation.

The unlined drilling pit was reclaimed during July 2008. Approximately 400 barrels of produced water were transferred from the drilling pit to the lined production pit (identified by OXY as "Pond 1"). Once the produced water was removed from the drilling pit it was backfilled with soil. A soil sample from the former drilling pit (2-3 feet bgs) was taken on September 2, 2008, and analyzed for BTEX and other compounds. Neither BTEX nor TPH were detected in that soil sample.

The lined production pit was constructed sometime between 2005 and 2006 for storage of "fresh water". The timing of when OXY began to use that pit for the management of produced water and/or "treated" produced water is not known.

The liner of the pit was damaged in 2006 when a deer became trapped in the pit and tried to escape. Roustabout Specialties Inc. (RSI) was contracted to repair the damage caused by the deer. During the repairs, damage to the liner seams was noted and reported to the manufacturer. At that time, the damage was attributed to the deer stretching the seams. RSI did not complete repairs on the liner, but they instead installed a second 20-mil liner in the pit. OXY closed the lined production pit in late 2008.

Samples of the fluid in the pit (Pond 1) contained benzene at a concentration of 3,200 µg/L, toluene at a concentration of 5,400 µg/L, total xylene at a concentration of 1,300 µg/L, 1,2,4-TMB at a concentration of 400 µg/L, and 1,3,5-TMB at a concentration of 630 µg/L. These are the same constituents detected in Spring 2. In addition, the fluid in the pit (Pond1) contained Cl at a concentration of 5,700 mg/L, Ca at a concentration of 110 mg/L, Mg at a concentration of 31 mg/L, Na at a concentration of 3,400 mg/L, and bicarbonate alkalinity as CaCO<sub>3</sub> at a concentration of 640 mg/L

Walsh conducted soil sampling and constructed four monitoring wells on September 17, 2008, through September 19, 2008. A hollow stem auger drilling rig was used until auger refusal, rotary coring was then used to complete the boring. Samples of unconsolidated materials were collected with a split spoon.

Six soil samples were collected during drilling (MW-1-1, MW1-2, MW-1-3, MW-2, MW-3 and MW-4) and analyzed for VOCs. BTEX compounds were not detected in any of the samples. Groundwater was not encountered during the investigation.

## **Discussion**

This review consisted of the following elements;

1. Evaluation of water quality data for the purpose of determining the nature of the contamination in each of the subject springs.
2. Evaluation of water quality data to determine the extent of that contamination.
3. Evaluation of the occurrence of groundwater in each of the two valleys in which the subject springs are located for the purpose of identifying the transport mechanism for the contamination.
4. Evaluation of information concerning potential sources of the contamination.

Several laboratories were used to analyze samples collected by the various investigative efforts and those laboratories did not have consistent reporting limits for their analytical methods. There was also a lack of consistency between the laboratories concerning the lists of target analytes associated with their respective analysis of samples for VOCs and SVOCs by gas chromatography mass spectroscopy (i.e. Methods 8260 and 8270). Additionally, samples collected were not consistently analyzed for a complete suite of organic and inorganic analytes. For example, analysis

for chloride was frequently specified; however, analysis for other anions, dissolved metals, fluoride, alkalinity series analytes, total dissolved solids, and general chemistry parameters was infrequently specified at some sampling locations and not at all at others. As a result, comparison of water quality data is difficult in some instances and not possible in others.

Evaluation of the occurrence of groundwater was complicated by inconsistency concerning the type of sampling and level of geological supervision during the three drilling events conducted by the 2008 Joint Investigation. Boreholes were continuously cored during the first event; split-spoon samples were collected and logged during the second drilling event; and apparently there was no soil or rock sampling or field screening during the third drilling event as none of the companies involved have submitted boring logs or field screening data for any of the 21 monitoring wells installed at that time. As a result, the data set for soils and rock on the eastern side of the valley in which the Prather Spring is located is incomplete. Further, there is no information (i.e. boring logs) for the purpose of verifying the intervals across which those monitoring wells are screened.

No groundwater samples representative of the shallow aquifer were collected on any of the pads while performing the work to evaluate potential sources. The samples of water collected from within the footprint of a reclaimed production pit on the Nonsuch Pad 697-14 appear to have been trapped or perched in fill material above the pit liner.

To date, a source, or sources, for the contamination of the springs has not been identified. However, the combination of the operational histories for each of the potential sources and the analytical data allow identification of more likely sources of the contamination as further discussed below.

### **Prather Spring**

As shown on Figure 2, there are several oil and gas exploration and production facilities located in the recharge area for the Prather Spring. Those facilities include, or have included, natural gas wells, drilling pits, production pits, pipelines, and condensate tanks. The following have been investigated as potential sources of the contamination found in the Prather Spring:

1. Nonsuch 697-14 Pad
2. Nonsuch Pipeline from the 697-14 Pad to the sales line
3. Nonsuch Condensate Tank
4. Marathon/PDC 23X Pad
5. Williams MV 1-23 Pad
6. Williams MV 1-23 Pipeline
7. Williams WGV Pad

8. Williams MV 6-14 Pipeline
9. Arco-Deep Condensate Tank

Some of the pits were closed prior to the initiation of the Joint Investigation. As a result, it was not possible to collect water samples from all of them. One exception was a production pit on the Nonsuch 697-14 pad from which a sample of produced water was collected prior to that pit being reclaimed in June 2008.

The concentrations of benzene, toluene, ethyl benzene and total xylenes in water collected from the Prather Spring are shown on Figure 3 and summarized in Table 1.

In general, the formation water produced with natural gas and stored in production pits tends to be characterized as having high chloride concentrations. In addition, liquid hydrocarbons can be entrained in the produced water. While produced water is in the pit, the liquid hydrocarbons will separate and may accumulate on the top of the water. COGCC rules require that accumulation of oil or condensate be removed within 24 hours. Therefore, one would expect that groundwater impacted by leakage from a produced water pit would have high chloride content and may have BTEX or other hydrocarbon compounds found in condensate.

Of the 30 monitoring wells constructed in the Prather Spring valley, only one well (PS-MW28) contained BTEX concentrations similar to those in the spring. BTEX components were not detected in the majority of the monitoring wells. Figure 4 shows the general distribution of BTEX compounds in the groundwater. The analytical results, extracted from the database provided by URS, are summarized on Table 1.

Table 6 summarizes the concentrations of major anions and cations detected in samples collected from the monitoring wells; however, many of the samples were not analyzed for these constituents. One method of comparing the general characteristics of water from different sources is to plot the concentration of the anions and cations on a stiff diagram. The shape of the stiff diagram changes as the ratio of the various anions and cations changes. Figure 5 displays the stiff diagrams for the deep monitoring wells and Figure 6 displays those for the shallow monitoring wells. The shape of the stiff diagrams for groundwater in the vicinity of the Prather Spring are consistent with a calcium-bicarbonate water type and resemble the composition of the typical groundwater in the area.

As shown on Figure 3, the chloride concentration remains relatively constant during the sample period except for a slight monotonic increase over the summer which is characteristic of springs on the Roan Plateau (Butler, D. L., *Discharge and Water Quality of Springs in Roan and Parachute Creek Basins, Northwestern Colorado, 1981-1983*, USGS Water-Resources Investigations Report 85-4078) while the concentrations of BTEX components varied. Given the similar shape of the stiff diagrams for the groundwater obtained from the monitoring wells and their actual chloride

concentrations, JCHA concludes that significant amounts of produced water have not impacted the groundwater associated with the Prather Spring. Rather, the contamination in the Prather Spring appears to be from a release of condensate.

None of the monitoring wells installed were placed downgradient of the Prather Spring. Since it is unlikely that all of the groundwater present in the valley discharges from the Prather Spring, it is possible that contaminants are present in the groundwater downgradient of the spring. It is also possible that the most heavily impacted groundwater bypasses the spring all together. Therefore, until the groundwater downgradient of the springs has been characterized, the full extent of the contaminated groundwater is unknown.

## **Spring 2**

As shown on Figure 7, several facilities relating to oil and gas production are present in the recharge area for Spring 2. These facilities include production pads with drilling and production pits and pipelines and associated condensate tanks. The following have been investigated as potential sources of the contamination found in Spring 2:

1. Nonsuch 697-14 Pad
2. Nonsuch Pipeline originating in Section 12
3. Marathon 23X Pad
4. Williams MV 1-23 Pad
5. OXY 15-54 Pad

The concentration of benzene, toluene, ethylbenzene and total xylenes in water collected from Spring 2 are shown on Figures 8a and 8b and summarized on Table 3. Figure 8a plots the data at the same scale used in Figure 3 to allow comparison of the concentrations between Spring 2 and the Prather Spring. Figure 8b uses an expanded scale to better present the ratios between the various constituents. Comparing Figure 8a with Figure 3 demonstrates that there are significant differences between the concentrations and their distribution between the Spring 2 and the Prather Spring.

Water from Spring 2 has much lower BTEX concentrations and much higher chloride concentrations than the water from the Prather Spring. Review of Figure 8b shows a 400 percent increase in chloride concentration associated with the appearance of BTEX compounds in Spring 2. The distribution of BTEX compounds shows that there are approximately equal concentrations of total xylenes and benzene with much lower concentrations of toluene and ethylbenzene.

As previously discussed, groundwater impacted by produced water would be expected to show increased chloride concentrations and would likely have elevated BTEX concentrations. The contaminants present in Spring 2 appear to have been the result of release(s) of produced water that has impacted ground water. The presence of

elevated chlorides and low concentrations of BTEX compounds would tend to rule out the pipeline as a possible source of the contamination in Spring 2. A release of condensate from the pipeline would likely result in high concentrations of BTEX compounds without an increase in chlorides.

None of the groundwater samples collected from any of the monitoring wells located within the Spring 2 valley had concentrations of BTEX compounds similar to those detected in the spring. The highest detected benzene concentration in the monitoring wells was 1.50 µg/L compared to almost 60 µg/L in Spring 2. Similarly, the highest detected concentration of total xylenes was 12 µg/L in the monitoring wells and about 70 µg/L in Spring 2. BTEX compounds were not detected in most of the monitoring wells. Figure 9 shows the general distribution of BTEX compounds in the groundwater. The analytical results, extracted from the site database provided by URS, are summarized on Table 2.

Stiff diagrams were constructed for those wells with analyses for inorganic components summarized on Table 4 (Na, K, Ca, Mg, Cl, HCO<sub>3</sub>, CO<sub>3</sub> and SO<sub>4</sub>). The shape of the stiff diagram changes as the ratio of the various anions and cations changes. Figure 10 displays the stiff diagrams for those wells completed in the lower zone and Figure 11 displays those for wells completed in the upper zone. The shapes of the stiff diagrams for groundwater in the vicinity of Spring 2 are characteristic of a calcium chloride type of water. This indicates that chloride has been added to the groundwater system. Unfortunately, samples from many of the monitoring wells were not analyzed for major anions and cations and as a result, stiff diagrams could not be created for all of the monitoring wells.

As shown on Figures 10 and 11, the concentration of the inorganic compounds is higher in Spring 2 than it is in any of the monitoring wells. This means that the source of at least some of the water in Spring 2 must be from a flow path other than those intersected by the monitoring wells. Further, essentially all of the monitoring wells have been impacted by increased chlorides, so the source of chlorides could have been from any of the potential sources of produced water located up gradient of Spring 2. The data also indicate that more than one release may have impacted the groundwater in the Spring 2 valley.

## **Conclusions and Recommendations**

### **Conclusions**

1. Both the Prather Spring and Spring 2 have been impacted by unauthorized releases of E&P waste.
2. The nature of the contamination detected in the Prather Spring is not the same as that of the contamination detected in Spring 2.

3. Major anions, cations, and general chemistry parameters were not analyzed in many of the ground water samples collected from monitoring wells in both the Prather Spring valley and the Spring 2 valley.

### Prather Spring

1. The contamination detected in the Prather Spring appears to be the result of a release of condensate based on the presence of elevated concentrations of volatile organic compounds without elevated concentrations of chloride which would be associated with produced water.
2. Stiff diagrams for the groundwater in the Prather Spring indicate a calcium bicarbonate type of water which is consistent with normal groundwater in the area and inconsistent with a release of produced water.
3. The distribution of BTEX compounds in groundwater samples collected from monitoring wells in the Prather Spring valley indicates the source of the condensate is likely located on the eastern side of the valley where only Williams has facilities.
4. Laboratory analytical results submitted by Nonsuch show that soil and water sampled within the boundaries of the former production pit on that company's 697-14 Pad have been impacted by E&P waste. The subject analytical results are for soil and water samples collected above the liner of the former production pit. Those media are not believed to be a source for the contamination detected in either the Prather Spring or Spring 2, but additional investigation and remediation of the impacted materials should be considered.

### Spring 2

1. The stiff diagrams for monitoring wells in the Spring 2 valley indicate calcium-chloride type water as opposed to the bicarbonate type water which occurs naturally in the subject area.
2. The nature of the contamination detected in Spring 2 is consistent with a release of produced water based on the elevated concentrations of chloride and total dissolved solids, and the presence of VOCs.
3. The distribution of elevated chloride, total dissolved solids, and VOCs concentrations in Spring 2 and monitoring wells, the presence of similar elevated organic and inorganic compounds in the fluids collected from one pit (Pond 1), together with the operational history of the two pits on the OXY 696-

15-54 Pad, indicates that this pad is a likely source for the contamination detected in Spring 2.

## **Recommendations**

### **Prather Spring**

1. Measure water levels and collect samples from the 32 existing monitoring wells in the Prather Spring valley basin as soon as possible after the beginning of spring runoff. Samples should be analyzed for both organic and inorganic parameters
2. Samples should be collected monthly through October weather permitting. Plot data on maps and graphs after each sampling event and evaluate possible source locations.
3. Investigate areas downgradient of the Williams operations on the southeast side of the Prather Spring valley, for possible condensate sources, including the Williams MV 6-14 pipeline and the Williams WGV pad.
4. Require Nonsuch to submit a Site Investigation and Remediation Work Plan proposing how they will investigate and remediate the material left in and placed in the pit on their 697-14 Pad.
5. Investigate the groundwater conditions downgradient of Prather Spring.

### **Spring 2**

1. Measure water levels and collect samples from the 12 existing monitoring wells in the Spring 2 valley as soon as possible after the beginning of spring runoff. Samples should be analyzed for both organic and inorganic parameters
2. Samples should be collected monthly through October weather permitting. Plot data on maps and graphs after each sampling event and evaluate possible source locations.
3. Conduct a detailed evaluation of the OXY pad including the collection of soil and rock samples beneath the former production pits, the material left in place within the former production pits, and the installation of additional monitoring wells to investigate groundwater flow paths from the pad to Spring 2.

4. Complete the investigation downgradient of the OXY pad to define the groundwater flow path delivering contaminates to Spring 2.
5. Investigate the groundwater conditions downgradient of Spring 2.

JCHA is pleased for this opportunity to assist you in your evaluation of the source of contaminants found in the Prather Spring and Spring 2. Please contact me if you have any questions or concerning this report.

Sincerely



Steven L. Lange  
Senior Geochemist

sll/cmd

## **TABLES**

Table 1  
Summary  
Organic Compounds  
Analytical Results  
Ned Prather Spring

Well id	Sample date	Lab id	1,2,4-TMB	1,3,5-TMB	Benzene	EthylBenzene	Toluene	Xylenes, total
Ned Prather Spring	05/31/08	EVAL	NA	NA	-1.00	-2.00	-2.00	-4.00
Ned Prather Spring	06/01/08	EVAL	NA	NA	-1.00	-2.00	-2.00	-4.00
Ned Prather Spring	06/02/08	EVAL	NA	NA	100.00	-10.00	310.00	1010.00
Ned Prather Spring	06/03/08	EVAL	NA	NA	110.00	-10.00	410.00	1000.00
Ned Prather Spring	06/03/08	TAMQ	76.00	100.00	160.00	-20.00	580.00	1200.00
Ned Prather Spring	06/06/08	CALC	41.00	95.00	73.00	-1.00	180.00	1090.00
Ned Prather Spring	06/09/08	EVAL	87.00	101.00	213.00	3.26	819.00	1610.00
Ned Prather Spring	06/20/08	CALC	-1.00	-1.00	-1.00	-1.00	-2.00	-2.00
Ned Prather Spring	06/23/08	CALC	NA	NA	190.00	-10.00	750.00	1330.00
Ned Prather Spring	07/15/08	FLD	NA	NA	230.00	-20.00	910.00	1900.00
Ned Prather Spring	07/17/08	EVAL	NA	NA	310.00	-20.00	1300.00	2100.00
Ned Prather Spring	07/22/08	EVAL	NA	NA	250.00	-20.00	900.00	2000.00
Ned Prather Spring	07/24/08	EVAL	NA	NA	210.00	-20.00	710.00	1600.00
Ned Prather Spring	07/29/08	FLD	NA	NA	230.00	-20.00	770.00	1900.00
Ned Prather Spring	08/01/08	FLD	NA	NA	270.00	-20.00	870.00	2100.00
Ned Prather Spring	08/04/08	CALC	NA	NA	350.00	-20.00	810.00	2200.00
Ned Prather Spring	08/07/08	CALC	NA	NA	290.00	-20.00	920.00	2300.00
Ned Prather Spring	08/11/08	CALC	NA	NA	240.00	-20.00	790.00	2100.00
Ned Prather Spring	08/14/08	EVAL	110.00	130.00	280.00	-10.00	890.00	2000.00
Ned Prather Spring	08/14/08	EVAL	110.00	130.00	270.00	-10.00	880.00	2000.00
Ned Prather Spring	08/19/08	EVAL	120.00	130.00	270.00	-10.00	940.00	2100.00
Ned Prather Spring	08/21/08	EVAL	120.00	140.00	260.00	5.00J	920.00	2100.00
Ned Prather Spring	08/21/08	CALC	120.00	140.00	270.00	5.50J	940.00	2100.00
Ned Prather Spring	08/25/08	EVAL	130.00	150.00	270.00	5.50J	980.00	2300.00
Ned Prather Spring	08/29/08	EVAL	120.00	140.00	270.00	6.50J	980.00	2300.00
Ned Prather Spring	08/29/08	EVAL	120.00	140.00	270.00	6.50J	950.00	2200.00
Ned Prather Spring	09/04/08	CSOL	140.00	160.00	320.00	9.30	970.00	2500.00
Ned Prather Spring	09/04/08	EVAL	140.00	160.00	270.00	8.00J	990.00	2500.00
Ned Prather Spring	09/10/08	PGNC	120.00	140.00	220.00	-50.00	760.00	1250.00
Ned Prather Spring	09/10/08	PGNC	120.00	140.00	240.00	-50.00	840.00	2370.00
Ned Prather Spring	09/17/08	EVAL	160.00	170.00	270.00	9.00J	880.00	2600.00
Ned Prather Spring	09/24/08	EVAL	180.00	180.00	260.00	9.00J	790.00	2800.00
Ned Prather Spring	09/24/08	EVAL	180.00	180.00	260.00	8.50J	770.00	2700.00
Ned Prather Spring	10/01/08	EVAL	180.00	190.00	250.00	10.00	620.00	2800.00
Ned Prather Spring	10/08/08	EVAL	190.00	200.00	240.00	9.50J	440.00	3000.00
Ned Prather Spring	10/08/08	EVAL	200.00	210.00	250.00	9.00J	430.00	3000.00
Ned Prather Spring	10/16/08	EVAL	210.00	210.00	230.00	11.00	230.00	3000.00
Ned Prather Spring	10/23/08	EVAL	220.00	220.00	210.00	12.00	76.00	2900.00
Ned Prather Spring	10/29/08	EVAL	220.00	230.00	210.00	12.00	27.00	2800.00
Ned Prather Spring	10/29/08	EVAL	220.00	230.00	200.00	11.00	25.00	2800.00
Ned Prather Spring	02/13/09	EVAL	NA	NA	58.00	-10.00	-10.00	1000.00

Negative Number indicates value below the indicated lower detection limit

NA Not Analyzed

Table 2  
Summary  
Analytical Results  
Major Cations & Anions  
Prather Spring

Well id	Sample date	Lab id	Na	K	Ca	Mg	Cl	SO4	CO3	HCO3	TDS
Ned Prather Spring	06/23/08	CALC	NA	NA	NA	NA	54.5	NA	NA	NA	356
Ned Prather Spring	07/15/08	FLD	NA	NA	NA	NA	62.2	NA	NA	NA	NA
Ned Prather Spring	07/17/08	EVAL	NA	NA	NA	NA	62.5	NA	NA	NA	NA
Ned Prather Spring	07/22/08	EVAL	NA	NA	NA	NA	65.0	NA	NA	NA	NA
Ned Prather Spring	07/24/08	EVAL	NA	NA	NA	NA	65.1	NA	NA	NA	NA
Ned Prather Spring	07/29/08	FLD	NA	NA	NA	NA	65.2	80.3	<5	302.0	NA
Ned Prather Spring	08/01/08	FLD	NA	NA	NA	NA	65.2	80.4	<5	298.0	NA
Ned Prather Spring	08/04/08	CALC	NA	NA	NA	NA	70.0	82.2	<5	289.0	NA
Ned Prather Spring	08/07/08	CALC	NA	NA	NA	NA	68.9	85.0	<5	290.0	NA
Ned Prather Spring	08/11/08	CALC	NA	NA	NA	NA	71.9	86.0	<5	290.0	NA
Ned Prather Spring	08/14/08	EVAL	NA	NA	NA	NA	73.0	79.4	<5	290.0	NA
Ned Prather Spring	08/14/08	EVAL	NA	NA	NA	NA	73.2	NA	NA	NA	NA
Ned Prather Spring	08/19/08	EVAL	NA	NA	NA	NA	74.5	NA	NA	NA	NA
Ned Prather Spring	08/21/08	EVAL	NA	NA	NA	NA	76.0	NA	NA	NA	NA
Ned Prather Spring	08/21/08	CALC	NA	NA	NA	NA	77.1	NA	NA	NA	NA
Ned Prather Spring	08/25/08	EVAL	NA	NA	NA	NA	78.3	NA	NA	NA	NA
Ned Prather Spring	08/29/08	EVAL	60	0.78	82.0	35.0	81.1	80.3	<5	302.0	NA
Ned Prather Spring	08/29/08	EVAL	60	0.82	82.0	35.0	80.6	80.4	<5	298.0	565
Ned Prather Spring	09/04/08	CSOL	58	0.87	78.0	33.0	84.9	82.2	<5	289.0	566
Ned Prather Spring	09/04/08	EVAL	NA	NA	NA	NA	NA	NA	NA	NA	547
Ned Prather Spring	09/10/08	PGNC	57	1.10	90.0	36.0	95.0	85.0	<5	290.0	570
Ned Prather Spring	09/10/08	PGNC	58	1.00	91.0	36.0	96.0	86.0	<5	290.0	560
Ned Prather Spring	09/17/08	EVAL	63	0.86	88.0	37.0	92.1	79.4	<5	290.0	520
Ned Prather Spring	09/24/08	EVAL	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ned Prather Spring	09/24/08	EVAL	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ned Prather Spring	10/01/08	EVAL	NA	NA	NA	NA	105.0	NA	NA	NA	NA
Ned Prather Spring	10/08/08	EVAL	NA	NA	NA	NA	106.0	NA	NA	NA	NA
Ned Prather Spring	10/08/08	EVAL	NA	NA	NA	NA	107.0	NA	NA	NA	NA
Ned Prather Spring	10/16/08	EVAL	NA	NA	NA	NA	114.0	NA	NA	NA	NA
Ned Prather Spring	10/23/08	EVAL	NA	NA	NA	NA	118.0	NA	NA	NA	NA
Ned Prather Spring	10/29/08	EVAL	NA	NA	NA	NA	117.0	NA	NA	NA	NA
Ned Prather Spring	10/29/08	EVAL	NA	NA	NA	NA	115.0	NA	NA	NA	NA
Ned Prather Spring	02/13/09	EVAL	88.0	1.30	110.0	48.0	181.0	33.9	<5	387.0	NA
Negative Number indicates value below the indicated lower detection limit											
NA Not Analyzed											

Table 3  
Summary  
Organic Compound  
Analytical Results  
Spring 2

Well id	Sample date	Lab id	1,2,4-TMB	1,3,5-TMB	Benzene	EthylBenzene	Toluene	Xylenes, total
Spring 2	06/03/08	TAMQ	-1.00	-1.00	-1.00	-1.00	-1.00	-2.00
Spring 2	06/09/08	EVAL	-0.50	-0.50	-0.50	-0.50	-0.50	-0.50
Spring 2	06/09/08	CALC	1.30J	1.10J	-1.00	-1.00	-2.55	-3.45
Spring 2	07/15/08	CALC	NA	NA	-1.00	-2.00	-2.00	-4.00
Spring 2	07/17/08	CALC	NA	NA	11.00	-2.00	-2.00	5.50
Spring 2	07/22/08	CALC	NA	NA	11.00	1.30J	-2.00	13.00
Spring 2	07/24/08	EVAL	NA	NA	3.40	-2.00	-2.00	4.00
Spring 2	07/29/08	CALC	NA	NA	31.00	3.50	-2.00	35.00
Spring 2	08/01/08	CALC	NA	NA	33.00	3.10	-2.00	31.00
Spring 2	08/04/08	CALC	NA	NA	34.00	4.00	-2.00	42.00
Spring 2	08/07/08	EVAL	NA	NA	36.00	3.30	-2.00	35.00
Spring 2	08/11/08	CALC	NA	NA	38.00	3.70	-2.00	40.00
Spring 2	08/14/08	EVAL	8.30	8.50	55.00	4.20	-1.00	50.00
Spring 2	08/19/08	CALC	7.80	8.30	50.00	3.50	-1.00	47.00
Spring 2	08/18/08	EVAL	8.80	8.70	57.00	4.00	-1.00	51.00
Spring 2	08/21/08	EVAL	7.20	7.70	42.00	4.10	-1.00	44.00
Spring 2	08/25/08	CALC	8.10	8.30	53.00	3.60	-1.00	45.00
Spring 2	08/25/08	EVAL	8.80	8.80	57.00	4.10	-1.00	48.00
Spring 2	08/29/08	CALC	9.80	9.40	55.00	5.40	5.00	47.00
Spring 2	08/29/08	EVAL	7.30	7.50	51.00	3.20	-1.00	40.00
Spring 2	09/04/08	EVAL	9.30	8.60	70.00	4.40	-1.00	52.00
Spring 2	09/04/08	EVAL	1.30	1.20	7.20	0.58	-0.20	6.80
Spring 2	09/10/08	PGNC	7.70	8.60	59.00	3.60	-2.50	44.00
Spring 2	09/17/08	EVAL	7.19	6.69	58.00	3.00	-1.00	42.00
Spring 2	09/17/08	EVAL	5.09	5.69	32.00	3.00	-0.20	30.00
Spring 2	09/24/08	EVAL	4.69	4.50	41.00	1.89	-1.00	29.00
Spring 2	10/01/08	EVAL	3.59	2.79	33.00	1.10	-1.00	22.00
Spring 2	10/01/08	EVAL	3.09	2.70	29.00	.94J	-1.00	20.00
Spring 2	10/08/08	EVAL	7.00	5.09	58.00	1.60	-1.00	41.00
Spring 2	10/16/08	EVAL	4.69	2.90	46.00	1.10	-1.00	28.00
Spring 2	10/16/08	EVAL	4.69	3.00	46.00	1.10	-1.00	27.00
Spring 2	10/23/08	EVAL	4.30	2.70	34.00	0.72	-0.40	23.00
Spring 2	10/29/08	EVAL	2.59	1.29	20.00	0.33	-0.20	13.00
Spring 2	02/13/09	EVAL	NA	NA	-1.00	-2.00	-2.00	-4.00
Negative Number indicates value below the indicated lower detection limit								
NA Not Analyzed								

Table 4  
Summary  
Analytical Results  
Major Cations & Anions  
Spring 2

Well id	Sample date	Lab id	Na	K	Ca	Mg	Cl	SO4	CO3	HCO3	TDS
Spring 2	07/15/08	CALC	NA	NA	NA	NA	286	NA	NA	NA	NA
Spring 2	07/17/08	CALC	NA	NA	NA	NA	568	NA	NA	NA	NA
Spring 2	07/22/08	CALC	NA	NA	NA	NA	554	NA	NA	NA	NA
Spring 2	07/24/08	EVAL	NA	NA	NA	NA	560	NA	NA	NA	NA
Spring 2	07/29/08	CALC	NA	NA	NA	NA	725	NA	NA	NA	NA
Spring 2	08/01/08	CALC	NA	NA	NA	NA	690	NA	NA	NA	NA
Spring 2	08/04/08	CALC	NA	NA	NA	NA	761	NA	NA	NA	NA
Spring 2	08/07/08	EVAL	NA	NA	NA	NA	782	NA	NA	NA	NA
Spring 2	08/11/08	CALC	NA	NA	NA	NA	775	NA	NA	NA	NA
Spring 2	08/14/08	EVAL	NA	NA	NA	NA	795	NA	NA	NA	NA
Spring 2	08/19/08	CALC	NA	NA	NA	NA	792J	NA	NA	NA	NA
Spring 2	08/21/08	EVAL	NA	NA	NA	NA	765	NA	NA	NA	NA
Spring 2	08/25/08	CALC	NA	NA	NA	NA	765J	NA	NA	NA	NA
Spring 2	08/25/08	EVAL	NA	NA	NA	NA	787J	NA	NA	NA	NA
Spring 2	08/29/08	CALC	120	12	140	47	428	32.7	-5	263	1310
Spring 2	09/04/08	EVAL	170	19	160	52	575	21.6	-5	318	1670
Spring 2	09/04/08	EVAL	240	27	190	62	774	3.6	-5	318	1680
Spring 2	09/10/08	PGNC	220	39J	220	62	700	2.4J	-5	320	2000
Spring 2	09/17/08	EVAL	230	26	200	61	718J	5.5	-5	321	1800
Spring 2	09/17/08	EVAL	240	29	190	60	707J	5	-5	326	1760
Spring 2	10/01/08	EVAL	NA	NA	NA	NA	721	NA	NA	NA	NA
Spring 2	10/01/08	EVAL	NA	NA	NA	NA	728	NA	NA	NA	NA
Spring 2	10/08/08	EVAL	NA	NA	NA	NA	678	NA	NA	NA	NA
Spring 2	10/16/08	EVAL	NA	NA	NA	NA	689	NA	NA	NA	NA
Spring 2	10/16/08	EVAL	NA	NA	NA	NA	688	NA	NA	NA	NA
Spring 2	10/23/08	EVAL	NA	NA	NA	NA	674	NA	NA	NA	NA
Spring 2	10/29/08	EVAL	NA	NA	NA	NA	645	NA	NA	NA	NA
Spring 2	02/13/09	EVAL	110	10	150	50	420	47.3	-5	231	NA
Negative Number indicates value below the indicated lower detection limit											
NA Not Analyzed											

Table 5  
Summary  
Organic Compounds  
Analytical Results  
Monitoring Wells  
Prather Spring Drainage

Well id	Sample date	Lab id	1,2,4-TMB	1,3,5-TMB	Benzene	EthylBenzene	Toluene	Xylenes, total
PS-MW02D	09/17/08	PGNC	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00
PS-MW02D	09/17/08	TAMN	-1.00	-1.00	-1.00	-1.00	-1.00	-3.00
PS-MW02D	10/16/08	EVAL	-0.20	-0.30	-0.20	-0.20	-0.20	-0.40
PS-MW02M	09/17/08	PGNC	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00
PS-MW03S	07/17/08	TAMQ	-1.00	-1.00	-1.00	-1.00	-1.00	-3.00
PS-MW03S	07/17/08	EVAL	NA	NA	-1.00	-2.00	-2.00	-4.00
PS-MW03S	08/15/08	FLD	-0.20	-0.30	-0.20	-0.20	-0.20	-0.40
PS-MW03S	09/04/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW03S	09/08/08	PGNC	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00
PS-MW03S	09/24/08	EVAL	-0.20	-0.30	-0.20	-0.20	-0.20	-0.40
PS-MW03S	10/16/08	EVAL	-0.20	-0.30	-0.20	-0.20	-0.20	-0.40
PS-MW03D	08/29/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW03D	09/08/08	TAMN	-1.00	-1.00	-1.00	-1.00	-1.00	-3.00
PS-MW03D	09/08/08	PGNC	-1.00	-1.00	10.90	-1.00	9.48	-1.00
PS-MW03D	10/16/08	EVAL	-0.20	-0.30	-0.20	-0.20	-0.20	-0.40
PS-MW03D	10/17/08	EVAL	-0.20	-0.30	-0.20	-0.20	-0.20	-0.40
PS-MW04S	07/17/08	EVAL	NA	NA	-1.00	-2.00	-2.00	-4.00
PS-MW04S	07/17/08	TAMQ	-1.00	-1.00	-1.00	-1.00	-1.00	-3.00
PS-MW04S	08/14/08	FLD	-0.20	-0.30	-0.20	-0.20	-0.20	-0.40
PS-MW04S	09/03/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW04S	09/03/08	PGNC	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00
PS-MW04S	10/16/08	EVAL	-0.20	-0.30	-0.20	-0.20	-0.20	-0.40
PS-MW04D	09/05/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW04D	09/08/08	PGNC	-1.00	-1.00	-1.00	-1.00	-1.00	0.17J
PS-MW04D	09/08/08	TAMN	-1.00	-1.00	-1.00	-1.00	-1.00	-3.00
PS-MW04D	10/17/08	EVAL	-0.20	-0.30	-0.20	-0.20	-0.20	-0.40
PS-MW05D	09/05/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW05D	09/08/08	PGNC	-1.00	-1.00	-1.00	0.21j	0.80j	-0.40
PS-MW05D	09/08/08	TAMN	-1.00	-1.00	-1.00	-1.00	0.93J	-3.00
PS-MW05D	10/17/08	EVAL	-0.20	-0.30	-0.20	-0.20	-0.20	-0.40
PS-MW06R	09/03/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW06R	09/07/08	EVAL	-0.20	-0.30	-0.20	-0.20	0.21	0.33j
PS-MW06R	09/08/08	PGNC	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00
PS-MW06R	09/08/08	TAMN	-1.00	-1.00	-1.00	-1.00	-1.00	-3.00
PS-MW06R	10/17/08	EVAL	-0.20	-0.30	-0.20	-0.20	-0.20	-0.40
PS-MW11D	07/21/08	EVAL	NA	NA	0.97J	-2.00	1.10J	-4.00
PS-MW11D	07/21/08	TAMQ	-1.00	-1.00	1.21	-1.00	1.34	-3.00
PS-MW11D	08/15/08	EVAL	-0.20	-0.30	0.50	-0.20	0.77	0.34J
PS-MW11D	09/03/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW11S	07/18/08	EVAL	NA	NA	-1.00	-2.00	-2.00	-4.00
PS-MW11S	07/18/08	TAMQ	-1.00	-1.00	-1.00	-1.00	-1.00	-3.00
PS-MW11S	08/15/08	EVAL	-0.20	-0.30	-0.20	-0.20	-0.20	-0.40
PS-MW11S	09/03/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW11S	09/10/08	PGNC	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00
PS-MW11S	10/16/08	EVAL	-0.20	-0.30	0.20	-2.00	0.27	-0.40
PS-MW12M	09/09/08	TAMN	-1.00	-1.00	-1.00	-1.00	-1.00	-3.00
PS-MW12M	09/10/08	PGNC	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00
PS-MW12M	10/17/08	EVAL	-0.20	-0.30	-0.20	-0.20	-0.20	-0.40
PS-MW13D	09/09/08	TAMN	-1.00	-1.00	-1.00	-1.00	0.33J	-3.00
PS-MW13D	09/10/08	PGNC	-1.00	-1.00	-1.00	-1.00	0.23J	-1.00
PS-MW-14	10/15/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW-14	10/22/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW-15	10/15/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW-15	10/22/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW-16	10/15/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW-16	10/22/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW-17	10/15/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW-17	10/21/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00

Table 5  
Summary  
Organic Compounds  
Analytical Results  
Monitoring Wells  
Prather Spring Drainage

Well id	Sample date	Lab id	1,2,4-TMB	1,3,5-TMB	Benzene	EthylBenzene	Toluene	Xylenes, total
PS-MW-18	10/15/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW-18	10/21/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW-19	10/15/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW-19	10/22/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW-20	10/15/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW-20	10/22/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW-21	10/15/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW-21	10/22/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW-22	10/16/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW-22	10/22/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW-28	10/15/08	CSOL	3.50J	-5.00	14.00	-5.00	2.20J	95.00
PS-MW-28	10/22/08	CSOL	57.00	-5.00	150.00	3.59J	21.00	1200.00
PS-MW-29	10/22/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW-29	10/22/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW-30	10/22/08	CSOL	-5.00	-5.00	2.79J	-5.00	3.20J	4.19
PS-MW-30	10/22/08	CSOL	-5.00	-5.00	1.29J	-5.00	1.39J	1.60J
PS-MW-31	10/22/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW-32	10/22/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW-32	10/22/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW-33	10/22/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW-34	10/22/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
Negative Number indicates value below the indicated lower detection limit								
	Concentration above the detection limit but below the PQL (J qualifier)							
	Concentration above the PQL but below the MCL							
	Concentration above the MCL							

Table 6  
Summary  
Analytical Results  
Major Cations and Anions  
Monitoring Wells  
Prather Spring Drainage

Well id	Sample date	Lab id	Na	K	Ca	Mg	Cl	SO4	CO3	HCO3	TDS
PS-MW02D	09/17/08	PGNC	42J	6.9J	50J	21J	18	56	-5	240	380
PS-MW02D	09/17/08	TAMN	51.04	6.25	46.59	19.13	14.07	58.15	-5	249.88	307
PS-MW02D	10/16/08	EVAL	32	1.2	58	19	4.3	48.1	-5	251	340
PS-MW03S	09/08/08	PGNC	28	0.91	58	18	8.8	47	-5	240	380
PS-MW03S	10/16/08	EVAL	32	1.1	58	19	7.5	46.4	-5	234	370
PS-MW03D	09/08/08	TAMN	50.7	3.33	51.44	17.18	5.95	72.82	-5	258	346
PS-MW03D	09/08/08	PGNC	42J	2.8	55	16	6.2	71	-5	220	370
PS-MW03D	10/16/08	EVAL	36	0.91	52	16	3.15	46.9	-5	224	324
PS-MW03D	10/17/08	EVAL	31	0.82	58	19	7.4J	46.5	-5	225	334
PS-MW04S	09/08/08	PSNG	27	0.61	56	18	8.4	45	-5	220	420
PS-MW04S	10/16/08	EVAL	31	0.68	56	19	7.3	45.8	-5	218	362
PS-MW04D	09/08/08	PGNC	48.89	2.24	49.6	17.44	11.63	52.53	-5	209	407
PS-MW04D	09/08/08	TAMN	45	2.1	50J	16	11	53	-5	230	360
PS-MW04D	10/17/08	EVAL	30	0.93	59	19	7.8	44	-5	238	358
PS-MW05D	09/08/08	TAMN	100	2.5	46	14	49.2	79.2	-5	364	550
PS-MW05D	10/17/08	EVAL	70J	1.3J	41J	14J	21.4	78.9	-10	929	428
PS-MW06R	10/17/08	EVAL	30	3.2	71	19	8.6	51.1	-5	250	367
PS-MW11S	09/10/08	PGNC	27	1	57	18	8.3	37	-5	210	310
PS-MW11S	10/16/08	EVAL	29	2.1	62	12	4.25	33.5	-5	209	295
PS-MW12M	09/09/08	TAMN	35.66	1.57	53.84	17.65	8.38	39.95	-5	280	227J
PS-MW12M	09/10/08	PGNC	32	1.7J	57	18	9.2	43	-5	280	330
PS-MW12M	10/17/08	EVAL	31	0.64	55	17	7.2	39.3	-5	272	311
PS-MW13D	09/10/08	PGNC	45	2.8J	56	19	15	49	-5	250	390

Negative Number indicates value below the indicated lower detection limit

Table 7  
Summary  
Organic Compound  
Analytical Results  
Monitoring Wells  
Spring 2 Drainage

Well id	Sample date	Lab id	1,2,4-TMB	1,3,5-TMB	Benzene	EthylBenzene	Toluene	Xylenes, total
PS-MW7D	09/05/08	CSOL	-5	-5	-5	-5	-5	-5
PS-MW7D	09/09/08	TAMN	-1.00	-1.00	-1.00	-1.00	-1.00	-3.00
PS-MW7D	09/10/08	PGNS	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00
PS-MW7D	10/17/08	EVAL	-0.20	-0.30	-0.20	-0.20	-0.20	-0.40
PS-MW7S	09/05/08	CSOL	-5.00	-5.00	2.60J	-5.00	2.90J	-5.00
PS-MW7S	09/06/08	CSOL	-5.00	-5.00	1.60J	-5.00	1.70J	-5.00
PS-MW7S	09/09/08	TAMN	-1.00	-1.00	1.50	-1.00	2.36	1.19
PS-MW7S	09/10/08	PGNC	-1.00	-1.00	0.49J	-1.00	0.72J	0.21
PS-MW7S	09/10/08	PGNC	-1.00	-1.00	0.34J	-1.00	0.53J	-1.00
PS-MW7S	10/17/08	EVAL	-0.20	-0.30	-0.20	-0.20	0.18J	-0.40
PS-MW8D	09/04/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW8D	09/08/08	PGNC	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00
PS-MW8D	09/08/08	TAMN	-1.00	-1.00	-1.00	-1.00	-1.00	-3.00
PS-MW8D	10/17/08	EVAL	-0.20	-0.30	1.20	-0.20	-0.20	-0.40
PS-MW8S	09/05/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW8S	09/08/08	PGNC	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00
PS-MW8S	09/08/08	TAMN	-1.00	-1.00	-1.00	-1.00	-1.00	-3.00
PS-MW8S	10/17/08	EVAL	-0.20	-0.30	-0.20	-0.20	-0.20	-0.40
PS-MW9S	09/09/08	TAMN	-1.00	-1.00	-1.00	-1.00	-1.00	-3.00
PS-MW9S	09/10/08	PGNC	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00
PS-MW9S	10/17/08	EVAL	-0.20	-0.30	-0.20	-0.20	-0.20	-0.40
PS-MW10D	09/09/08	TAMN	-1.00	-1.00	-1.00	-1.00	-1.00	-3.00
PS-MW10D	09/10/08	TAMN	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00
PS-MW10D	10/17/08	EVAL	-0.20	-0.30	-0.20	-0.20	-0.20	-0.40
PS-MW10S	09/08/08	TAMN	-1.00	-1.00	0.37J	-1.00	-1.00	-3.00
PS-MW10S	09/09/08	PGNC	-1.00	-1.00	0.76J	-1.00	-1.30	0.73
PS-MW10S	10/17/08	EVAL	-0.20	-0.30	-0.20	-0.20	0.12J	-0.40
PS-MW23	10/21/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW24	10/21/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW25	10/21/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW26	10/21/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	-5.00
PS-MW27	10/22/08	CSOL	1.29J	-5.00	-5.00	-5.00	-5.00	12.00
PS-MW27	10/22/08	CSOL	-5.00	-5.00	-5.00	-5.00	-5.00	4.80J
Negative Number indicates value below the indicated lower detection limit								
			Concentration above the detection limit but below the PQL (J qualifier)					
			Concentration above the PQL but below the MCL					
			Concentration above the MCL					

Table 8  
 Summary  
 Analytical Results  
 Major Cations and Anions  
 Monitoring Wells  
 Spring 2 Drainage

Well id	Sample date	Lab id	Na	K	Ca	Mg	Cl	SO4	CO3	HCO3	TDS
PS-MW7D	09/10/08	PGNS	80	4J	100	31	150	130	-5	230	710
PS-MW7D	10/17/08	EVAL	88	2.3	94	26	61.2	190	-5	236	690
PS-MW7S	09/09/08	TAMN	66.94	1.86	118.4	45.5	231.5	67.15	-5	322	729J
PS-MW7S	09/10/08	PGNC	58	1.8J	130	48	280	70	-5	210	860
PS-MW7S	09/10/08	PGNC	57	1.7J	130	48	280	72	-5	200	880
PS-MW7S	10/17/08	EVAL	63	1	140	49	293	67.7	-5	210	864
PS-MW8D	09/08/08	PGNC	252.2	4.58	101.6	34.87	294.3	131	-5	298	1130
PS-MW8D	09/08/08	TAMN	210	4	110	36	270	180	-5	220	1000
PS-MW8D	10/17/08	EVAL	120	1.4	95	31	194	131	-5	215	755
PS-MW8S	09/08/08	PGNC	99.01	8.24	110	37.03	246.73	78.07	-5	314	732
PS-MW8S	09/08/08	TAMN	80	7.8	120	37	260	58	-5	230	900
PS-MW8S	10/17/08	EVAL	87	5.4	120	40	269	64.1	-5	240	806
PS-MW9S	09/09/08	TAMN	28.93	1.92	50.71	15.65	7.3	33.1	-5	242	265J
PS-MW9S	09/10/08	PGNC	26	2J	56	16	6.9	32	-5	210	300
PS-MW9S	10/17/08	EVAL	30	0.65	72	23	57.4	36.7	-5	209	410
PS-MW10D	09/09/08	TAMN	55.83	1.31	101.66	35.27	225.7	53.63	-5	312	582J
PS-MW10D	09/10/08	TAMN	49J	1.6J	120	37	200	58	-5	220	630
PS-MW10D	10/17/08	EVAL	54	1.6	120	39	217	57.6	-5	220	706
PS-MW10S	09/08/08	TAMN	65.59	1.94	123.8	44.65	287	63.42	-5	220	623J
PS-MW10S	09/09/08	PGNC	57	1.6J	140	46	290	68	-5	210	870
PS-MW10S	10/17/08	EVAL	60	1	140	48	300	65.8	-5	248	880

Negative Number indicates value below the indicated lower detection limit

## FIGURES

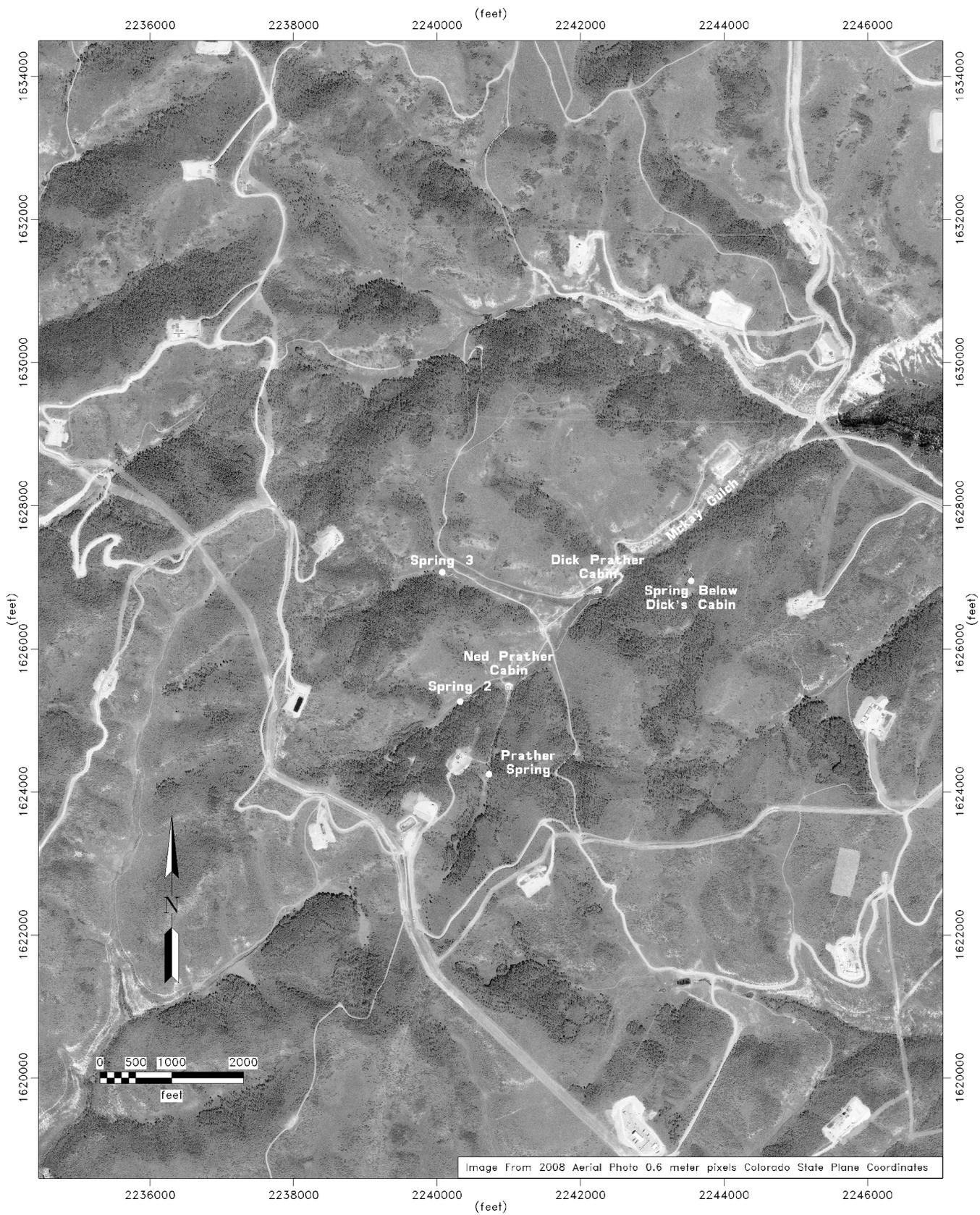


FIGURE 1 Project Vicinity



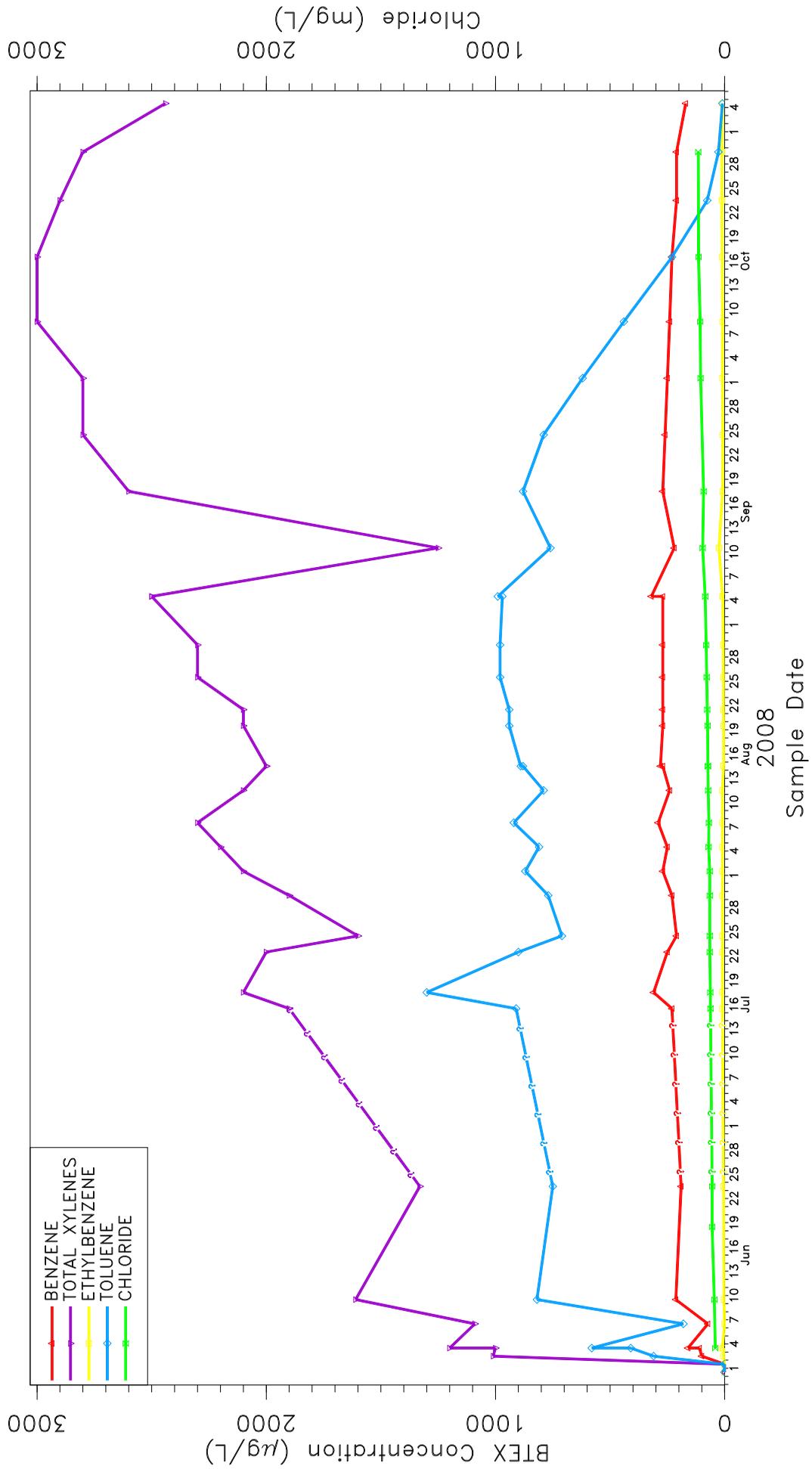


Figure 3 CONCENTRATION NED PRATHER SPRING

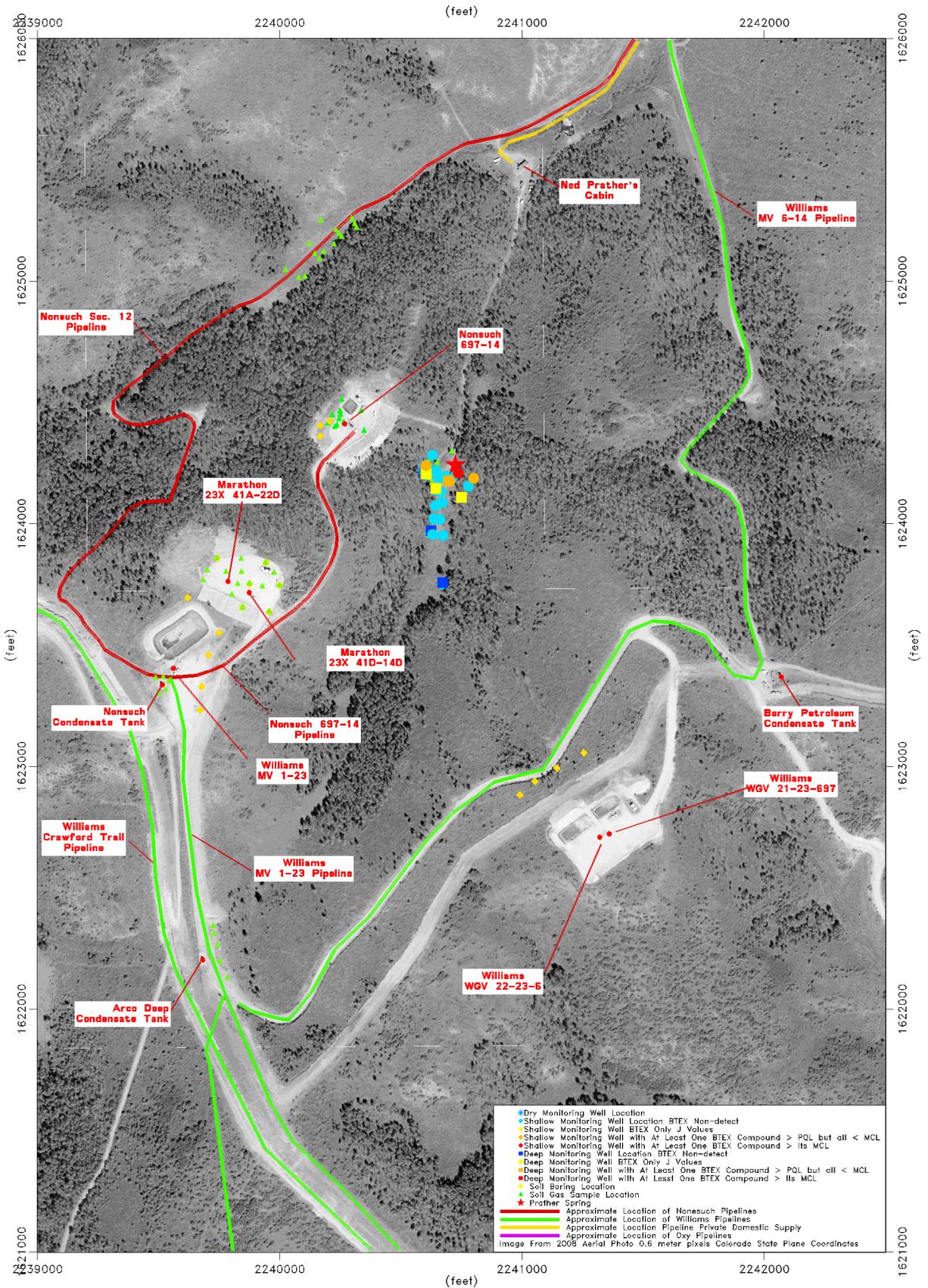


FIGURE 4 BTEX Distribution Prather Spring Valley

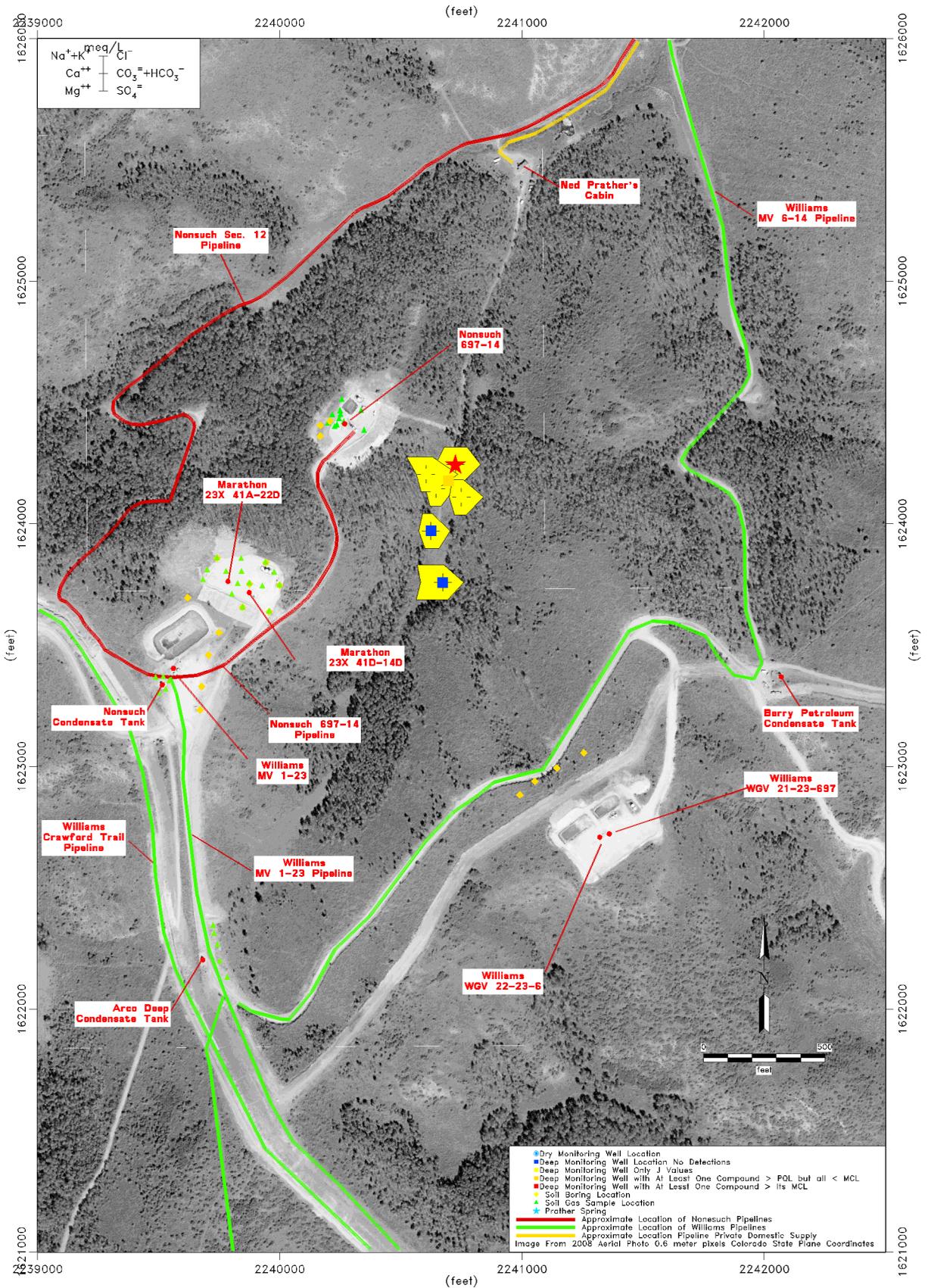


FIGURE 5 Stiff Diagram for Deep Groundwater Zone



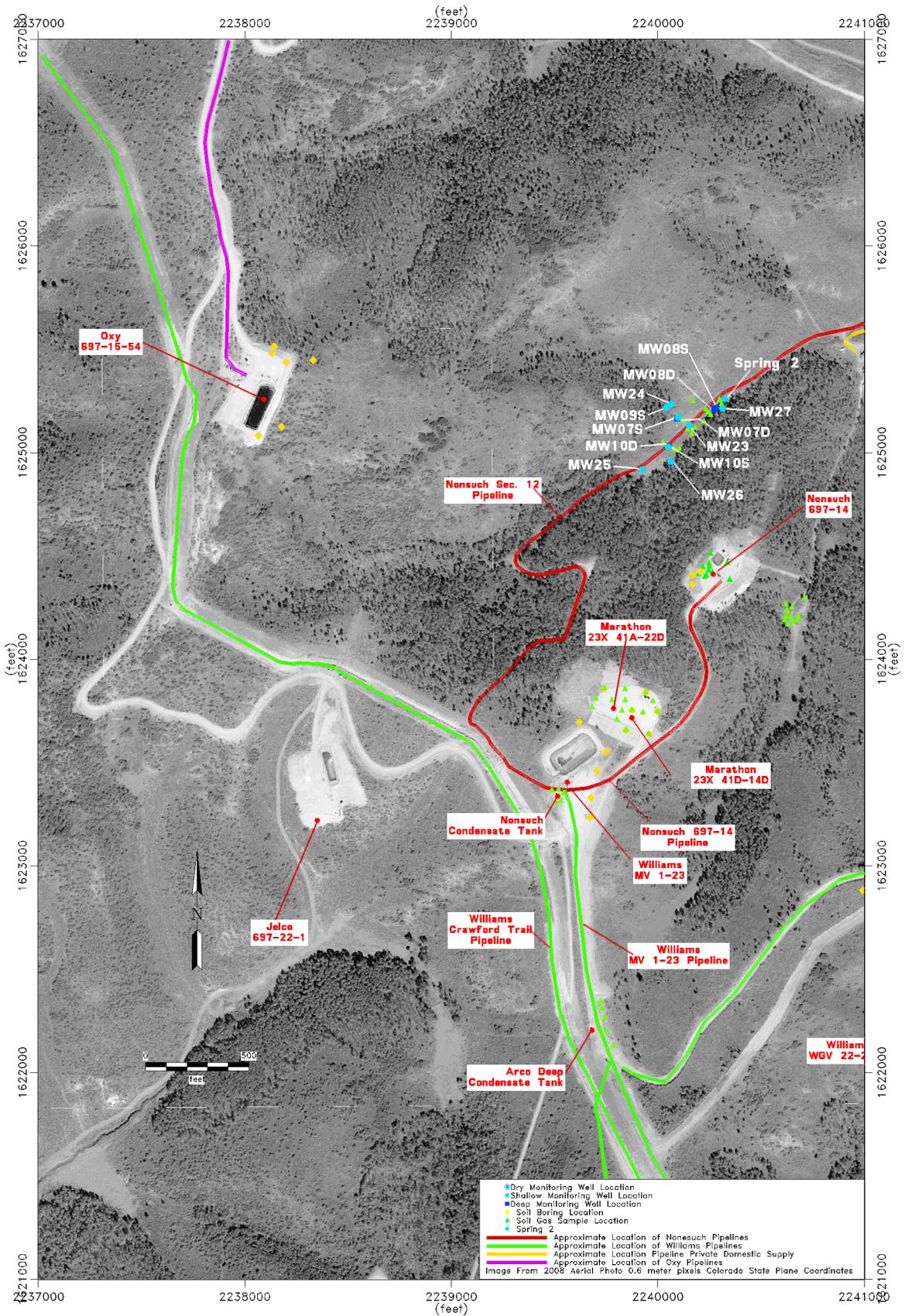


FIGURE 7 Site Features Spring 2 Valley

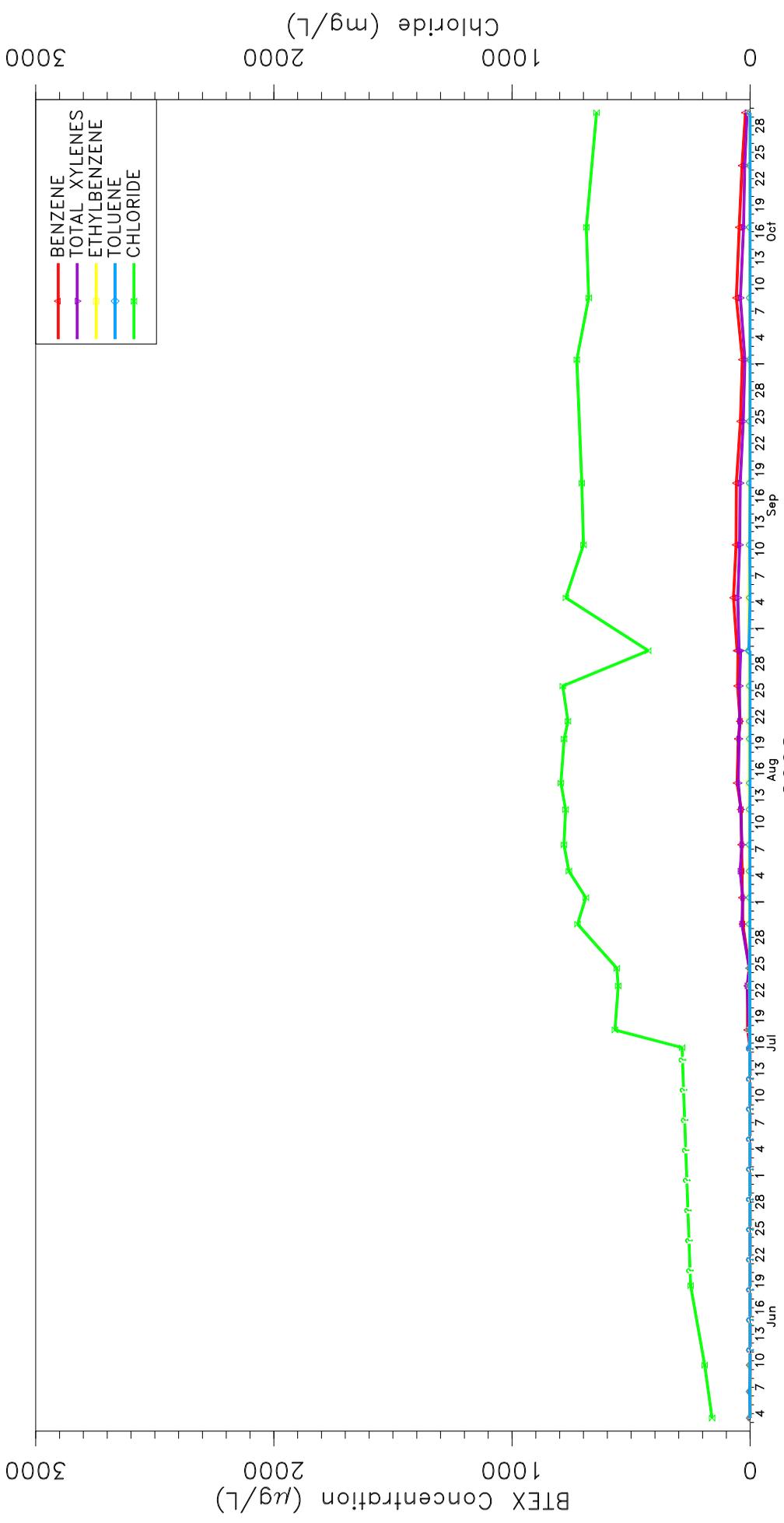


Figure 8a CONCENTRATION SPRING 2

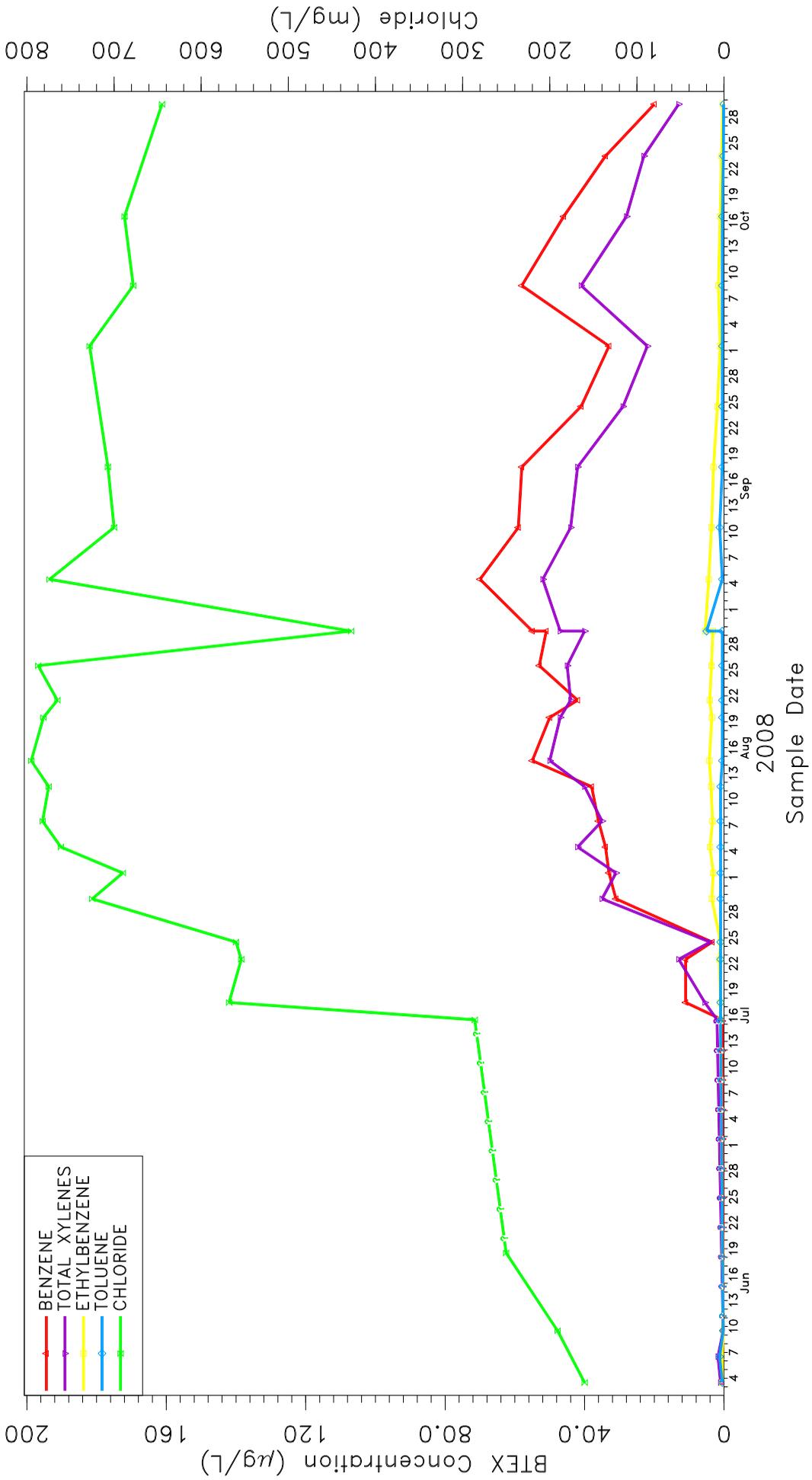


Figure 8b CONCENTRATION SPRING 2 Expanded Scale

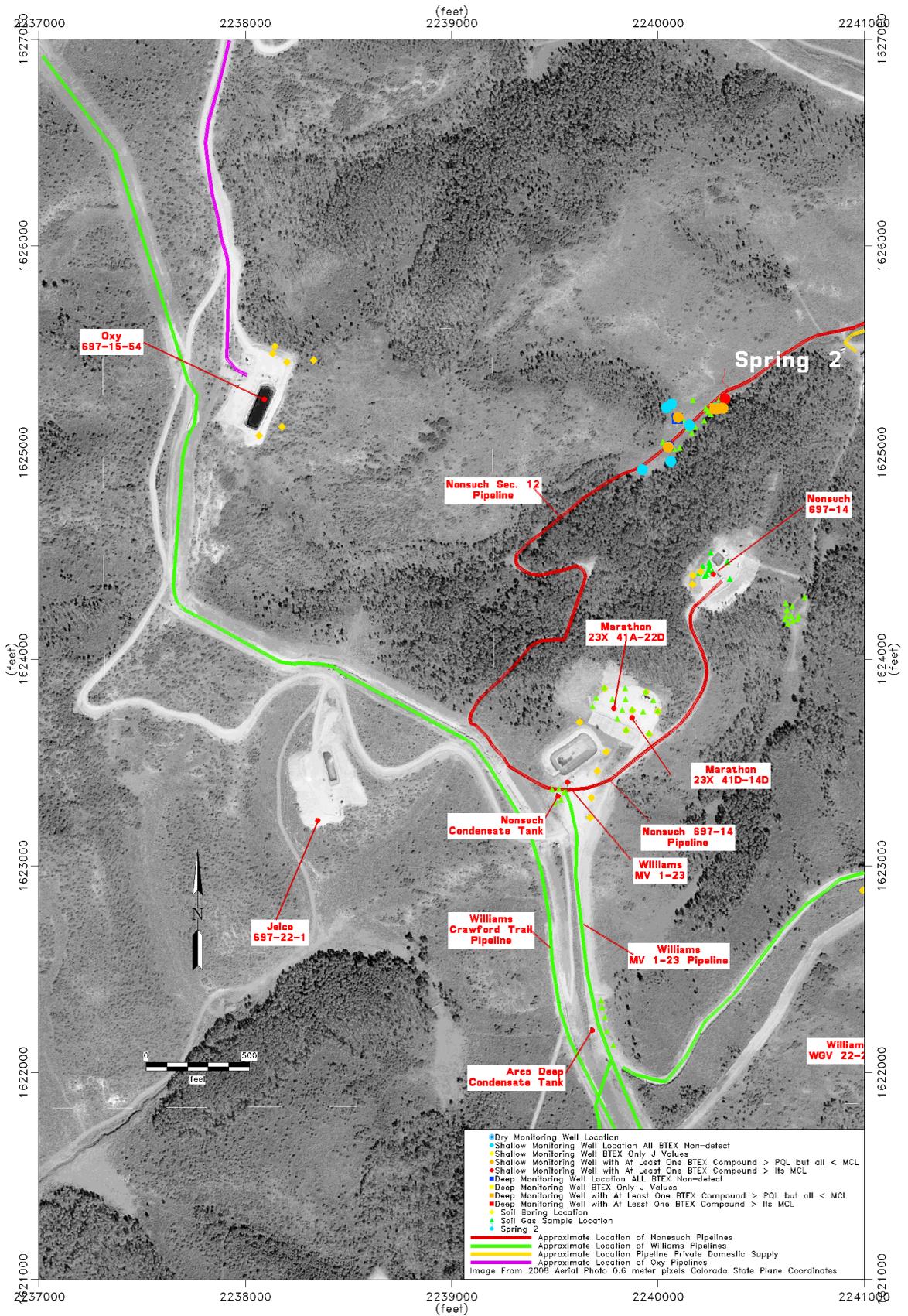


FIGURE 9 BTEX Distribution Spring 2 Valley

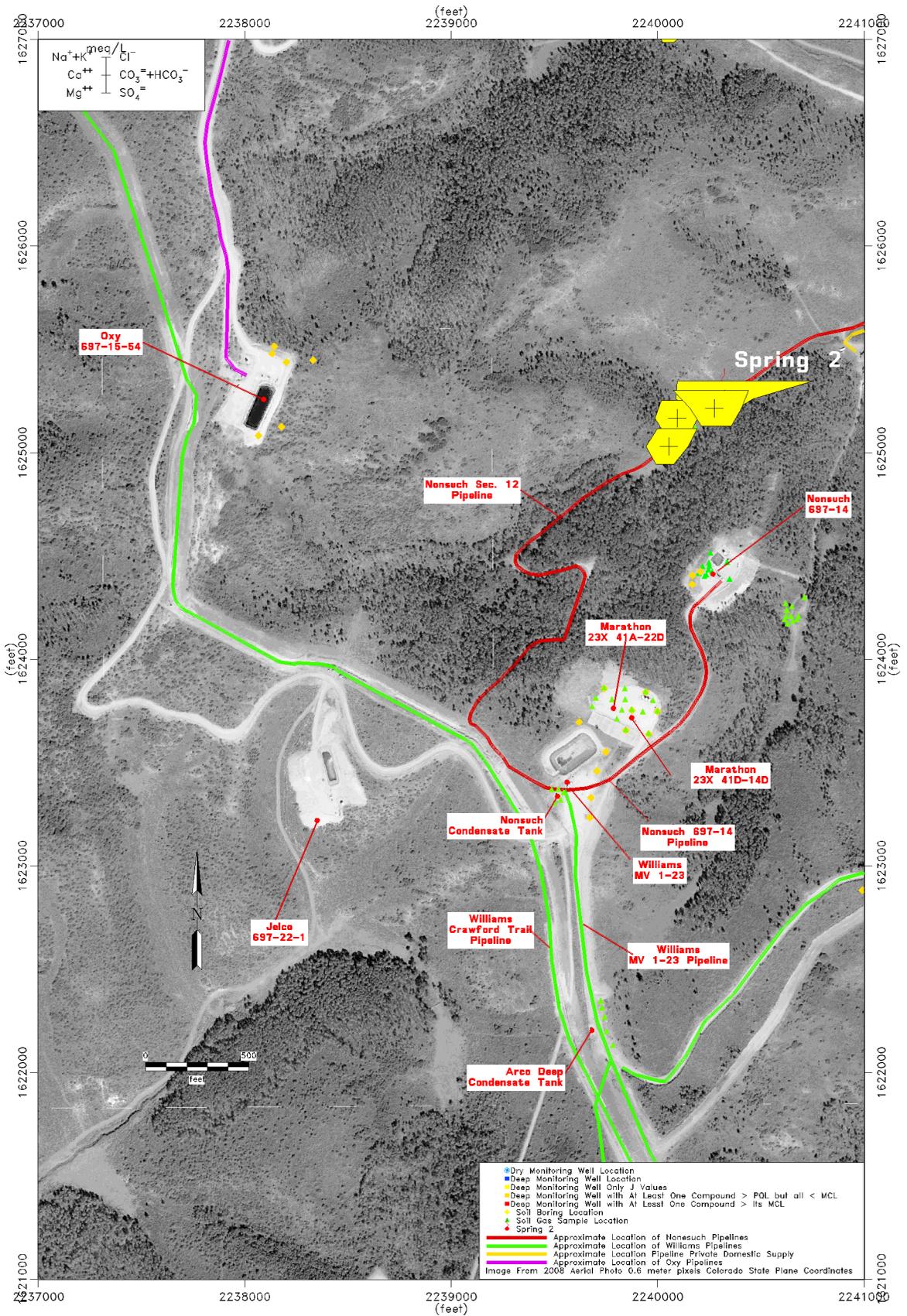


FIGURE 10 Stiff Diagrams for Deep Groundwater Zone

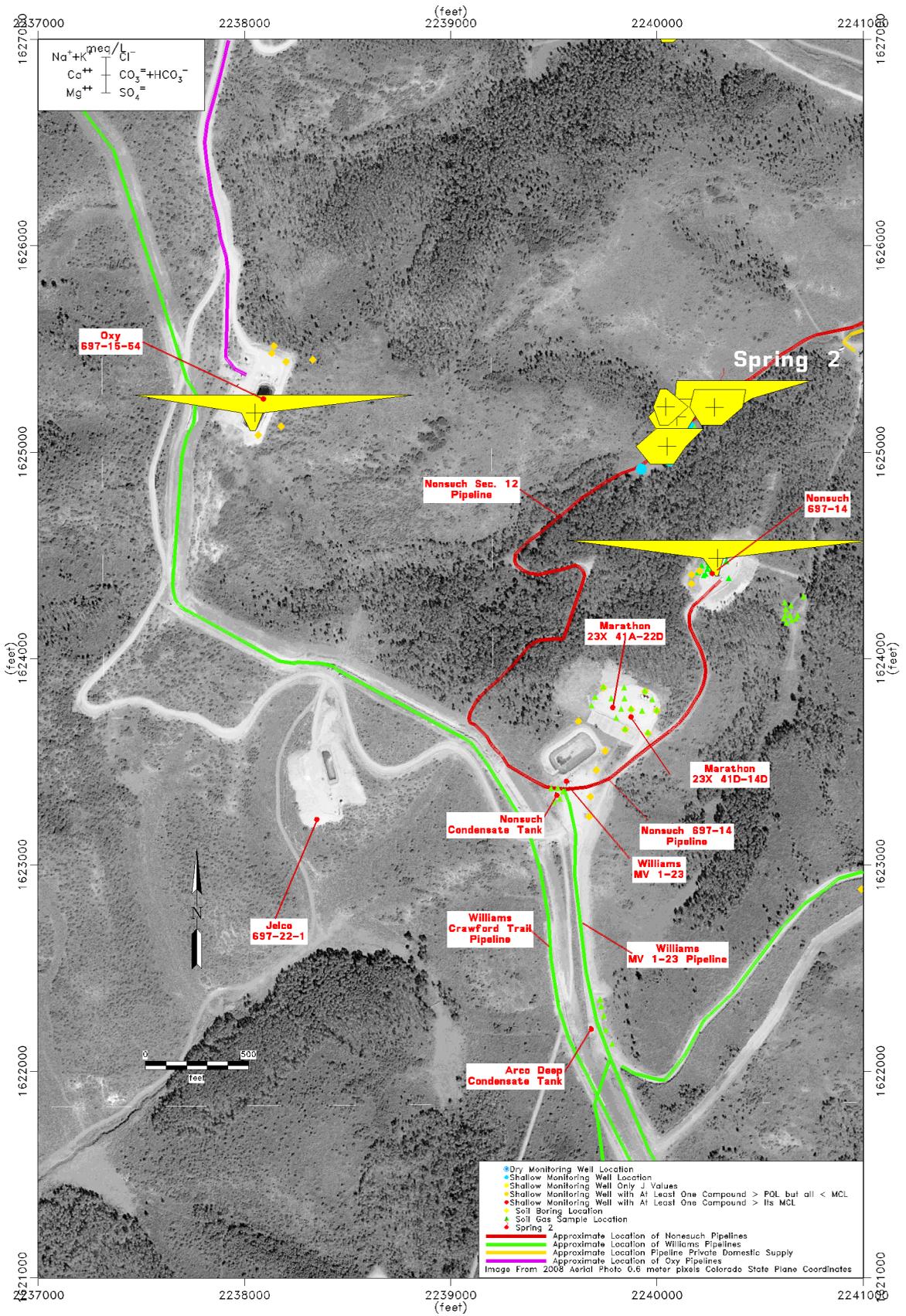


FIGURE 11 Stiff Diagrams for Shallow Groundwater Zone