Investigation into Complaint of New Gas Seep West Divide Creek 2007-2008

Colorado Oil & Gas Conservation Commission

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OUTLINE

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Introduction

- COGCC has received several complaints since October 2007 alleging that a "new gas seep" has appeared in West Divide Creek.
  - Black material "seep"
  - Sheen on surface water and soil
  - Stressed vegetation
  - Gas bubbling in creek or ponds
  - Changes in river bank deposits
- Investigated through field visits, sampling and analysis, and data review.

Site Description

- Location
  - Section 12 Township 7 South Range 92 West
  - Garfield County
- Description
  - Braided stream channel in an intermountain canyon
  - Stream flows highly variable
  - Wetlands
  - Ponds develop near creek due to beaver dams and debris piles
  - Alluvial deposits consist of clay, silt, sand, gravel, cobbles and boulders along stream channel
  - Wasatch Formation underlies alluvial deposits and forms canyon walls.

Site Visit - November 2007

Site Visit - December 2007

Site Visit - September 2008

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Site Visit - September 2008

Background

- 6 field visits conducted by COGCC environmental and or engineering staff from November 2007 to December 2008.
- Sampling and Analysis
  - Samples
    - 9 soil samples
    - 1 evaporative deposit sample
    - 2 groundwater samples (water well and seep from river bank)
    - 2 surface water samples
    - 2 gas samples

Background

- 2 samples of "stressed" vegetation
- 3 mineralogical samples

- Samples submitted for analysis of:
  - dissolved methane, stable isotopes
  - volatile organics (VOC), semi-volatile organic (SVOC)
  - gasoline range organics (GRO), diesel range organics (DRO)
  - x ray diffraction (XRD) and polarized light microscopy (PLM)
  - Plant diagnostics

RESULTS

- No VOC, SVOC or GRO were detected.
- Dissolved Methane: 43 ug/l in (area 2) surface water sample and 28 ug/l in water well (EB-culvert).
- Stable isotopes from 2007 consistent with 2004 samples indicting gas bubbling in surface water features is of biogenic origin.

RESULTS

- 3 DRO detections ranging from 8.1 to 12 mg/kg.
  - Concentrations near method detection limit.
  - These detections were not consistent with a diesel fuel
  - DRO detections considered to be more indicative of naturally occurring hydrocarbon material such as terpenes from pine needlest, tannic acid from leaves and or other aromatic oils from sage and similar plants (EAL).

RESULTS

- Plant Samples – CSU Plant Diagnostic Lab
  - Oak leaves dry with black spots
    - Natural senescence, the black spots have a fungus growing on them, but are secondary colonizers and not the cause of the decline.
  - Grass
    - The grass has been colonized with advanced stage fungi.

CONCLUSIONS

- Black Seep material
  - No VOC, SVOC or GRO compounds were detected and the DRO detections are outside the pattern that a diesel fuel would generate.
  - Appears to be naturally occurring organic rich alluvial material (sand with silt and clay).

CONCLUSIONS

- Sheens/biofilm
  - The orange and purple sheens noted on surface water and soils are naturally occurring biofilms.
  - BART testing shows that IRB and SRB bacteria exist in the surface water.
  - Laboratory testing indicates that the surface water, ground water and soils contain iron and manganese which are used in oxidizing process by IRB.
  - Biofilms occur naturally in wetland environments and are not necessarily an indication of impact from oil and gas activity.
  - No biofilms were noted during the December 2008 site visit.

CONCLUSIONS

- Plant studies conducted by CSU Plant Diagnostic Laboratory showed no indication of impacts from oil and gas activities.
- River Bank Deposits - Mineralogical Studies
  - Material was collected from along stream channel and compared to an EnCana frac sand sample.
  - River bank material is not consistent with frac sand.
  - Material differs from frac sand in texture, grain size, and composition.

CONCLUSIONS

- Gas Sampling
  - Two gas samples collected by COGCC in 2007.
  - Isotopic analysis identified gas as near surface microbial methane.
  - No gas bubbles noted in fall site visits and only trace amounts noted during December 2008 site visit.
  - Data does not indicate a new gas seep is occurring.