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"Technical Support for Grassroots Public Interest Groups"

Sept 20, 2016

Alannah Hurley
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Re: DNR July 2016 Pebble site visit report
Cc: Dave Chambers, dchambers@csp2.org

Introduction

Over two days in July 2016, DNR visited 92 borehole sites on the first day (over about 6 hours) and 42 on the second day (over about 4 hours). They also visited seven "structures", for a total of 141 "sites. Of these 23 were ones that CSP2 also visited. Some of the sites visited had "sets" of wells at one location (e.g. SRK5 has three wells next to each other drilled to different depths). If we remove these additional wells, there were 105 borehole site locations that DNR visited (17 overlap with CSP2 sites). Approximately 20% of the sites DNR visited were also ones that CSP2 went to in August 2016 over a five day period.

Of the total 1,357 boreholes drilled at the site, DNR visited 141 sites over two days in July and CSP2 visited 150 sites over five days in August. Removing the overlapping sites, a total of 268 sites were visited by either DNR or CSP2, or approximately 20% of all the drilled boreholes. CSP2 also visited three of the same structures that DNR went to: the main camp, the "watershed" (emergency and remediation supplies), and the barrels used to test material for acid drainage and metal leaching.

Comparison of investigations at overlapping sites

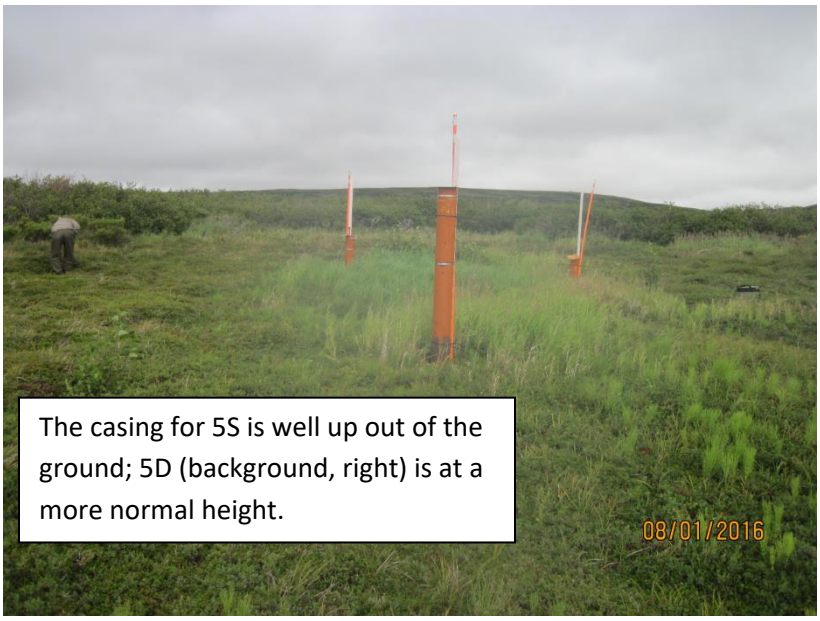
Many of the photos from DNR are aerial, so it is not possible to determine if they landed at many of the sites. DNR did not appear to take any field meter readings (pH, conductivity) or take any samples for lab analysis. CSP2 landed at all sites for which we wrote up information, collected field data at several (although not all) sites, and collected environmental samples (soil, sediment, water) for lab analysis at dozens of sites.

I hope you find this useful. We look forward to doing a more thorough write up when the general chemistry results are in.

Regards,

Kendra Zamzow, PhD

SRK5D, M, S. This is a set of three wells in the same location. DNR visited all three, but only discussed 5D (with aerial photo). CSP2 noted that 5S was jacked well out of the ground. However, we did not see any signs of contamination or any standing water.



The casing for 5S is well up out of the ground; 5D (background, right) is at a more normal height.

DDH 7365. DNR visited this site but did not have any notes about it in their report. CSP2 noted that this well had a ball valve on it, which if turned produced a firehose spray of water; there was a sulfide smell when the valve was opened. This site is not far (50 feet?) from a pond that USGS sampled in 2008.

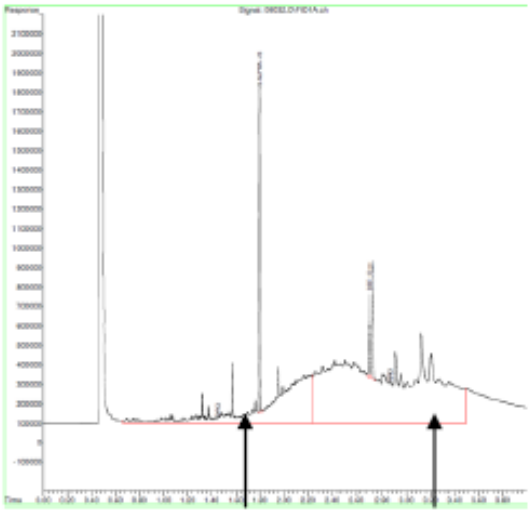
We took a sample of the borehole water and of the nearby pond for general chemistry (awaiting results). The pH of borehole water (collected from spray when valve opened) was neutral (pH 6.7-7.8, differed with the meter used) and water was cold (6C). The pond pH was also neutral (pH 6.4-7.3) but warmer (13-15C).

DDH 5330. DNR took a photo and said the 2015 repairs were successful, although there was some water ponded at the base of the casing. It is not clear if DNR landed at the site. This is listed as an "active well".

We noted that there was water pooled at the base of the old rusted open casing with iron staining and a sheet, although we could not determine if there were artesian conditions that caused the water pool or not. About 100 feet away was another borehole (DDH 7366) in a swampy area but plugged and without water pooled around it. There was no evidence of drill mud waste pits at DDH 5330.

The soil was pH 7.2 and water was pH 6.4, temp 11-13C, and specific conductance around 215 uS/cm. The sediment around the standpipe had a "red fluffy" texture, with black (sulfide smell) below that, then gray about 6 inches lower.

We took samples of water and sediment for fuels analysis and general chemistry. The soil showed evidence of fuels contamination by heavy hydrocarbons (RRO at 2,680 ppm) but the water did not (<1 ppm of DRO or RRO). We do not know whether this is from drilling mud or some other material.



DRO area

RRO area

Sheen on water – sample collected by CSP2 for water and sediment

DDH 6343 and 8423. These two wells were about 15' apart. DNR and CSP2 each visited both of them. DNR noted that the former problems at both drill holes in 2015 had been repaired, with the casing at DDH 6343 "sealed and wrapped" and DDH 8423 was "spray foamed to prevent water penetration". CSP2 noted that a ziploc had been duct-taped over the casing head. The casing was not leaking, there was no water at the site and CSP2 did not collect field data. DNR took photos of both sites, but they are aerial photos and it is not clear if they landed. They did not mention that there was no identification marker for DDH 8423.

DDH 8417. This was a fully reclaimed site with no casing remaining. DNR did not write up notes for this site; CSP2 did not collect field data. CSP2 noted that there were mud pits, with some living and some dead vegetation on the pits.

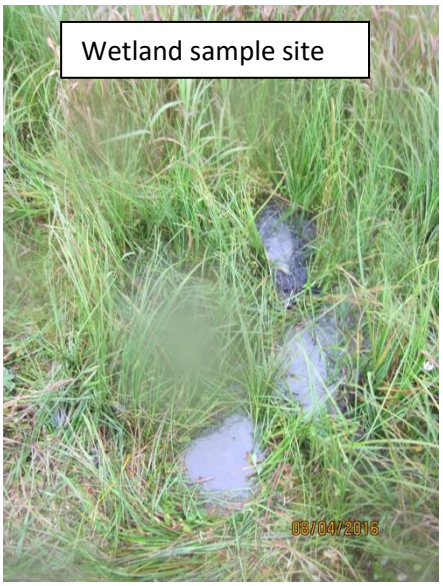
DDH 5332. This is a reclaimed site with no casing. DNR has a photograph (aerial) and notes that the well was producing a small flow but it was not near a water body and there was no iron staining. CSP2 noted it was a wet area with no sign of drill sumps but did not collect field data.

There was no sign of a well casing – only the post laying in the grass next to water. Does DNR think the water could be coming from the casing, even though it is cut off below ground and plugged? They only note that it is a wet area and the source of water is unclear. They asked PLP to investigate the cause and submit a work plan.

DDH 7382. DNR had no photos or notes, other than their pre-visit notes that a new cap had been installed in 2015 to control a minor leak. We visited this site in a rainstorm, which may have affected the material we saw. It had a gravelly material around the casing – the only site where we saw that – and was leaking some sort of milky fluid. I rolled up my sleeve and stuck my arm down in the gravel and could feel that the material was present at least 12" down, and it was running at least 10' away from the casing into the tundra. The cap was welded onto the casing. I wonder if the material only flows up during rains? It's too bad there is no picture from DNR, when it was not raining.

Gravelly material with milky fluid down the casing and in the gravel. Cap welded to casing.

The soil pH was 6.5, water at the base of the drill casing was pH 7.2, wetland water downgradient was pH 5.2 (which can be normal for a wetland). Water at the casing had specific conductance of 289 uS/cm and in the spring about 10' downgradient (following the mud trail) the specific conductance was 209 uS/cm; both had temperatures about 10C. There was no sign of acid drainage and the conductivity could be normal for wetlands.

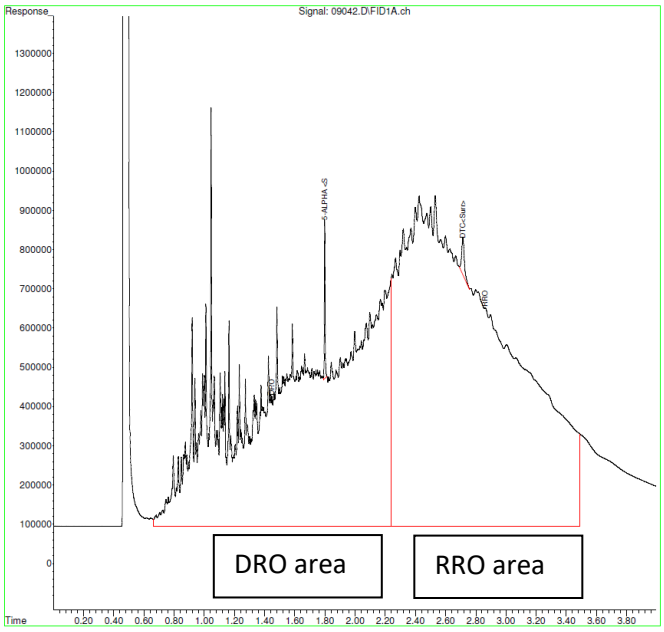


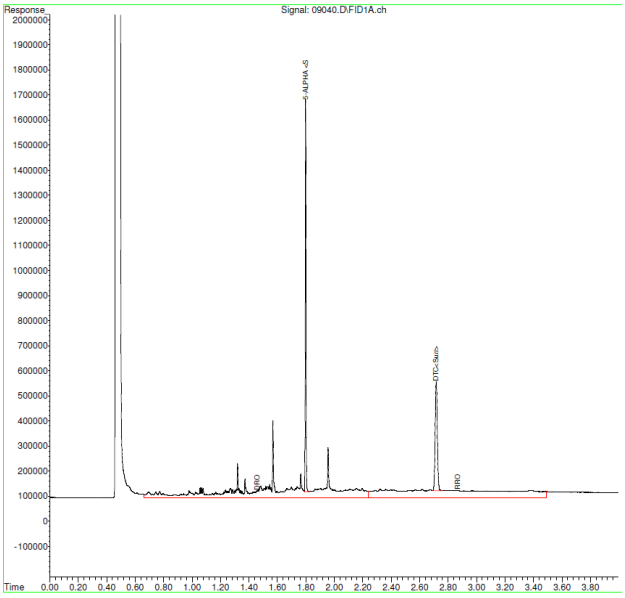
Wetland sample site

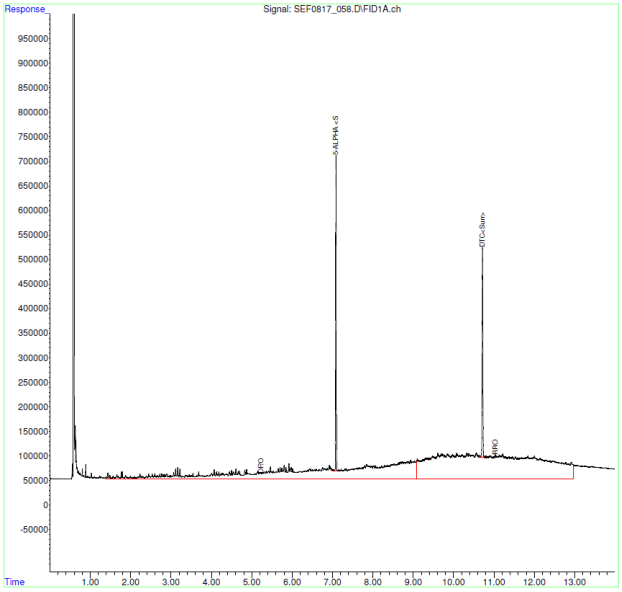
We took samples for fuels analysis and found that the wetland sediment (collected along the mud trail about 10' downgradient of the casing) was contaminated with diesel-like hydrocarbons and heavier hydrocarbons (DRO at 2,890 mg/kg, RRO at 6, 470 mg/kg) but the wetland water overlying the sediment was not contaminated, nor was the gravelly material at the base of the casing. This is a site that deserves further attention.

Stormy weather!

Wetland sediment downgradient of borehole had fuels contamination (right). The material around the borehole (below) and wetland water (below right) did not have fuels contamination.







P05-30D, 30S. DNR has no notes or photos of this site. CSP2 noted that it was a pair of capped wells with bare ground between but took no field data.

DDH 9475. DNR noted that water was being produced outside the casing, despite grouting in 2015 to 40' deep on one side and 80' deep on the other with sand, cement, and bentonite, and that water was flowing 132' downhill. CSP2 noted that the identification post was on the ground and a spring was bubbling red mud and gray sand, with a trail of red (iron-stained) mud going downhill.

DNR asked PLP to "investigate a resolution" and monitor vegetation.

We took samples for general chemistry (metals, salts, etc – results not back yet) but not for fuels analysis. We did take the water pH and conductivity, but upon returning to base camp saw that the meter was not reading correctly, therefore we cannot be sure that the data is valid. The measurements we had were
At the spring (drill hole), the water temperature was 7.4C with a specific conductance was 1,221 uS/cm; about 12' downgradient the water was pH 4.9, temp 9C, specific conductance 1,360 uS/cm. If the readings were correct, these indicate some possible acid drainage.

We saw no casing, only the downed post, which suggests the artesian flow is occurring despite the casing being plugged and cut off below ground. Also, this location, if I

recall, was on the top of a hill, so unsure what is driving artesian conditions.

P05-36D, 36M, 36S. DNR has no notes or photos. CSP2 notes that the site is a nest of 3 wells with caps unlocked and plastic tubing trash around them. We did not collect field data.

GH11-270S. DNR has no photos or notes for this site. CSP2 did not take field samples. There was a closed cap on this well.

GH06-72. DNR notes a minor upwelling with a rusty plug on the casing and a sheen – likely from bacteria – in water pooled at the base. Both CSP2 and DNR have photos from ground level. CSP2 noted the artesian flow, with PVC and metal rod pushed up out of the casing, but the location was the soggiest we had been to and the helicopter was unable to land or to shut down – I could only duck out and get a photo while the heli hovered.

Footprints filled with water when you walked.

DDH 10481. This was a fully reclaimed site with no casing. Long mud pits were present. There was a trail, bare of vegetation, to the pits and on top of the pits was dead tundra that was not rooting to the soil. DNR has no notes or photos. CSP2 did not collect field samples.

MW05-13D, 13S. This is a set of monitoring wells that is actively available to monitor groundwater, and caps were closed on top of the casings. There did not appear to be any problems at the site. DNR took no photos or notes, and CSP2 did not collect samples.