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Cobrain, Dave, NMENV



ENTERED

LANL Groundwater  
Sandia-Martinez Cyns  
Chromium Plume  
Production Wells PM-3 and ~~PM-4~~ PM-4

**From:** Dale, Michael, NMENV  
**Sent:** Friday, August 23, 2013 10:57 AM  
**To:** Cobrain, Dave, NMENV; Wear, Benjamin, NMENV; Kulis, Jerzy, NMENV; Longmire, Patrick, NMENV  
**Cc:** Yanicak, Steve; Kieling, John, NMENV  
**Subject:** FW: Recent Sampling Results for R-35a and Cr results for PM-4  
**Attachments:** R-35A (06-26-13).pdf; R-35a R-35b hydrographs 8-14-13.docx

FYI -

First, recent Cr results for PM-4:

HWB recently received some dissolved low-level total chromium results for production well PM-4, located about 3/4 miles southwest of R-50. The PM-4 sample was collected on July 10, 2013, a couple of weeks after the re-built pump was turned on. The result was 6.10 ug/L with a blind duplicate result of 6.29 ug/L which are 0.5 ug/L greater than our NMED preliminary UTL of 5.53 ug/L (mean of 3.12 ug/L). Note that the well was taken off-line back in 2011 and was placed back on-line in June this year. The hydrochemical composition of PM-4 groundwater indicates that production is from the upper screened section in Puye Fm which compliments the Spinner log data that show most of the flow originates from the Puye Fm, not the deeper Chamita Fm. Remember also that the aquifer testing at PM-4 back in 2004 or 2005 showed that the cone of depression from PM-4 pumping propagates outward for roughly 9,000 ft, way into to Cr plume which has major implications.....I'll do some research to confirm/reference this distance. Personally, I think PM-4 is pulling the Cr plume southward, i.e., another reason to install a nature and extent well south of R-50.

Some recent Cr, etc. results for sentinel wells R-35a and R-35b from Pat Longmire at the OB:

Recent DOE OB Cr results (see attached) for the deep-screen sentinel well R-35a came in at 8.34 ug/L with a re-analysis result of 7.86 ug/L. The 8.34 ug/L is double that of earlier sampling events. The sample was collected on May 16, 2013. The Cr results along with other tracer-type contaminants were compiled by OB's Patrick Longmire and submitted to DOE back in late June.

Cr at the water-table screened sentinel well R-35b bounces around from 5 - 9 ug/L which suggests the presence of contamination. Sewage-type compounds are also elevated at R-35b. The major hydrochemical signatures between R-35a and R-35b are dissimilar enough to suggest different contaminant sources.

I'm not a LANL Rocket Scientist but one would suspect that the pumping at PM-3 is pulling contamination inward along deep, preferential flow paths. The R-35a hydrograph, as attached, seems to support this model where head pressures cycle about 30 feet per year in conjunction with summer-time (extra) pumping at PM-3. This type of head response is rare across the plateau but then again R-35a and R-20 S2 are the only deep sentinel wells at LANL. Head pressure at R-20 S2 reacts with about 4 or 5 feet of cycling per year during PM-2 pumping. The trace-element and isotopic data (14C, d13C, d2H, d18O) for both R-35a and PM-3 reflect deep pumping from the deeper Santa Fe Group Chamita Fm, not the upper Santa Fe Group Puye Fm sediments such as R-35b where the screen is located in the lower Puye Fm.

Head data for R-35b suggest that the portion of aquifer adjacent to the screen is not in hydraulic communication with PM-3 pumping as observed on the attached hydrograph for R-35b. The contaminants at R-35b are likely floating on the water table, sourced from a leaky perched zone in beneath Sandia Canyon or maybe Los Alamos Canyon.

Enough for now.

Call if you have questions, and I hope you have a good weekend,



Michael

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From: Longmire, Patrick, NMENV  
Sent: Wednesday, August 14, 2013 2:26 PM  
To: Dale, Michael, NMENV  
Subject: FW: Recent Sampling Results for R-35a

Michael,

This email was sent to Steve paris on June 28, 2013.

Pat

Patrick Longmire, Ph.D  
Aqueous Geochemist

DOE Oversight Bureau-New Mexico Environment Department  
1183 Diamond Drive, Suite B  
Los Alamos, New Mexico 87544  
Office: 505-661-2681

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From: Longmire, Patrick, NMENV  
Sent: Friday, June 28, 2013 8:19 AM  
To: Steve Paris; Yanicak, Steve; Longmire, Patrick, NMENV  
Subject: FW: Recent Sampling Results for R-35a

Hi Steve,

An email that I sent to DOE this week regarding potential low-level contamination at R-35a is attached. We should schedule resampling this well in July 2013. Please advise.

Sincerely,

Pat

Patrick Longmire, Ph.D  
Aqueous Geochemist

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From: Longmire, Patrick [plongmire@lanl.gov]  
Sent: Friday, June 28, 2013 7:56 AM  
To: ; Longmire, Patrick, NMENV; mrdale@comcast.net  
Subject: FW: Recent Sampling Results for R-35a

Patrick Longmire, Ph.D  
Aqueous Geochemist

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From: Longmire, Patrick  
Sent: Wednesday, June 26, 2013 9:47 AM  
To: Shen, Hai; Arturo Duran; Thomas Skibitsky; Yanicak, Stephen M; Longmire, Patrick  
Subject: Recent Sampling Results for R-35a

All,

Analytical results for R-35a sampled during 2011 through May 2013 are attached. The geochemical data show the following:

Concentrations of total dissolved chromium (Cr) increased from approximately 4 ug/L during 2011 and 2012 to 8 ug/L by May 2013. The provisional NMED UTL(95, 95) value for total dissolved Cr is 5.53 ug/L for the regional aquifer.

Dissolved concentrations of boron (B) varied from 39.4 to 47.2 ug/L during 2011 through May 2013. The provisional NMED UTL(95, 95) value for dissolved B is 26.8 ug/L for the regional aquifer.

Dissolved concentrations of chloride (Cl) varied from 5.98 to 6.79 mg/L during 2011 through May 2013. The LANL UTL(95, 95) value for dissolved Cl is 2.98 mg/L for the regional aquifer.

Based on the recent analytical results for R-35a and statistics for background solute concentrations in the regional aquifer, it is likely that low-level contamination is present at R-35a.

Chromium(VI), B, and Cl are conservative tracers not undergoing significant adsorption onto regional aquifer material under moderately oxidizing and basic pH conditions. Well R-35a is screened at depths overlapping with the upper portion of the screen interval at nearby supply well PM-3. We can coordinate additional sampling at both wells in the near future. Please feel free to contact me regarding this topic.

Sincerely,

Pat

Patrick Longmire, Ph.D  
Aqueous Geochemist

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**Groundwater Chemistry Data for Dissolved Boron (B), Chloride (Cl), and Chromium (Cr) and Statistic Parameters for R-35a, 2011 – 2013.**

**Prepared by Patrick Longmire, June 26, 2013**

Date	11-17-11	05-12-06	11-13-12	05-16-13	Background Mean (ug/L)	Background Median (ug/L)	Background Range (ug/L)	2 Sigma (ug/L)	UTL (95, 95) (ug/L)
NMED B (ug/L)	39.4	39.4	47.2	46.4, <sup>a</sup> 44.1	14.19	13.45	9.8 – 28.0	6.58	26.8
LANL Cl (mg/L)	5.98	6.37	6.27	6.79	2.11	2.09	1.42 – 4.73	0.78	2.98
NMED Cr (ug/L)	4.28	4.44	4.26	8.34, <sup>a</sup> 7.86	3.12	2.87	1.24 – 5.52	2.06	5.53
LANL Cr (ug/L)	5.04, J	4.07, J	6.25, J	4.57, J	4.01	Not available	1.5 – 15.4	3.54	10.44

Note: <sup>a</sup>44.1 means reanalysis of filtered groundwater sample. Groundwater samples were filtered through 0.45-micrometer membranes. NMED background concentrations for solutes in the regional aquifer are based on 102 filtered samples analyzed by high-resolution inductively coupled mass spectrometry (HR-ICPMS) analyzed by ALS. There are 100 percent detects for boron (B) and chromium (Cr) for the NMED background data set.

