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Sent: Monday, August 19, 2019 12:00 PM
To: Schmoller, Michael R - DNR
Cc: Martin, Steven L - DNR; Wojner, Wendell J - DNR; Ackerman, Jeffrey A - DNR
Subject: Keck Update

Keck Farm Overview

General
Some reductive dichlorination occurring. Plume is slowly spreading (release occurred around 1971) with some increasing concentrations and some decreasing concentrations. Site appears to be on a groundwater divide. Predominant flow direction (based upon concentrations and gw elevations) appears to be to east but TCE was detected at wells to north and west. Highest was 0.51J for TCE.

Notable changes
- TCE increasing steadily at MW-1C (and vinyl chloride also increasing) in source area (112' deep)
- TCE decreasing at MW-3, MW-4, MW-5, and MW-6; all near source area.
- TCE decreasing at MW-8, south portion of east treeline
- TCE had been increasing at MW-9, north portion of east treeline. However, it appears to have peaked in 2005 and maybe decreasing a little since then.
- TCE, DC & VC increasing at MW-19C. This well is inside the farmstead
- TCE decreasing at MW-28D & MW-35D
- TCE converting to VC at MW-36D.
- TCE converting to VC at MW-40D
- TCE increasing at MW-43D
- VC increasing at MW-44D
- TCE & VC increasing at MW-45D.

Problems/Repairs
- Had proposed to sample **MW-11D** near source area. Concentrations were steady but not sampled since 2009. There is an **obstruction** here preventing the pump from being lifted out of well. About 34' deep.
- Can't collect gw elevations from **MW-12D or 13C due to obstructions** at 21' and 45' (was 2' below TOC so moving downward) deep, respectively.
- Protective casings damaged at MW-12D, 13C, 30D, INJ-1, and INJ-4 preventing locks from being attached
- Several wells shallower than previously documented: MW6, MW9, MW11D, MW19C, 22C, 25C, 26C, 27, 29, 33D (26' deeper), 35D, 41D, and 46D
- Soil eroded below concrete seal at MW45D
- Animal burrow next to MW-15 (trip hazard)

Depths of Injection Wells (do we hire somebody to conduct an injection)?
INJ-1 – expected 191, actual 174
INJ-2 – **expected 188, obstructed**
INJ-3 – expected 186, actual 167
INJ-4 – expected 189, actual 168
INJ-5 – expected 193, actual 171
INJ-6 – 182'
INJ-7 – 184'
INJ-8 – 153'

INJ-9 – 153’
(there is also an animal hole next to INJ-5 and no cap/lock mechanism & cracked metal casing at INJ-4)

Jason’s initial recommendations (or just go with something simpler to get more of the wells sampled at once)

Well	Sample	Develop	Repair	Abandon	Depth	Notes
MW-1C	xx				112’	TCE & VC increasing
MW-2	x	x			69’	South. Not sampled since 2000, TCE increasing at that time
MW-3					42’	West. Decreasing TCE. Still high though (2019).
MW-4					67.5’	East. Decreasing TCE. 2019
MW-5					62’	North. Decreasing TCE. 2019
MW-6					65’	Center. Decreasing TCE. 2019
MW-7					58’	Far southeast. Stable. 2019
MW-8					72’	Southeast. Decreasing TCE. 2019
MW-9	x				90’	Northeast. High TCE. Stable. Dropped since 2005 but still 110,000 ug/L. 2019
MW-10D	x	x			144’	North. Not analyzed since 2009. Low TCE.
MW-11D	x	x	x		140’	Center of site. Pump stuck in well. Obstruction 34’ deep. Stable TCE at 1,270 but not sampled since 2009.
MW-12D				x	142’	NE inside farmstead. Obstruction 21’ deep, damaged casing. Decreasing TCE, 41 ug/L. Not sampled since 2002. No cap/lock mechanism.
MW-13C				x	138’	Middle of farm field. Obstruction in well that is moving downward, damaged casing. Bent casing from bullet. Only sampled once in 2000 and was ND. Nothing else ever found in this area. No lock/cap mechanism.
MW-14D	x	x			175’	Middle of farm field. Historically low TCE. Not sampled since 2000.
MW-15				x	79’	Middle of farm field. animal burrow. Only sampled twice. Last one was 2000. Low TCE.
MW-16C				Later	140’	Historically ND for TCE. Not sampled since 2000.
MW-17	x	x			80’	Middle of farm field. Low TCE. Not sampled since 2001.
MW-18D				Later	179’	Middle of farm field. Sampled once in 2000. Next to MW14D. ND.
MW-19C	xx				108’	NE inside farmstead. Increasing TCE, VC, & DCE. 2019
MW-20C					115’	South inside farmstead. Stable TCE at 160 ug/L. 2019.
MW-21D	x	x			124’	Way SE of farmstead in farm field. TCE ND. Not sampled since 2008.
MW-22C	x	x			84’	West in field. Only sampled once in 1990, ND
MW-23D	x	x			128’	West in field. Historically ND but not sampled since 2008.
MW-24	x	x			34’	West in field. Only sampled in 1990 & 2000. ND both times.
MW-25C				x	110’	SE edge of site in treeline next to MW-7. Historically low TCE and decreasing. Not sampled since 2008. **20’ shallower than expected.**
MW-26C					124’	In woods E of MW-9 (impacted well). Historically low TCE, including 2019.

MW-27					86’	NE inside farmstead near MW-5. Only sampled twice. Last one was 2000. TCE=3,300. **6’ shallower than expected.**
MW-28D					196’	Center of site. TCE stable. Last sampled 2019.
MW-29					83’	83’ deep. Center of site. Sampled in 1990 & 2000. TCE=480 ug/L.
MW-30D	x	x	x		207’	East inside farmstead. Historically low TCE levels. Last sampled 2009. No locking tab on casing. Next to 19C.
MW-31D	Abandoned 2002					
MW-32D	x	x			108’	Farthest well to east. Historically ND but last sampled 2008.
MW-33D				x	61’	Farthest well to east. Flowing well. Not sampled since 2008. 26’ shallower than expected.
MW-34D	x	x			94’	Farthest well to east. Historically ND. Not sampled since 2008.
MW-35D					153’	Slightly east in field. Concentrations decreasing (2019).
MW-36				x	47’	ESE of farmstead. Historically ND. Not sampled since 2008. Diving plume.
MW-36D					143’	ESE of farmstead. Stable TCE in 2019.
MW-37D					141’	SE of farmstead. Decreasing TCE (ND). Last sampled 2008.
MW-38D					145’	SSE of farmstead. Historically ND (2008).
MW-39D					130’	SE of site. Historically ND (2017).
MW-40D	x				140’	Slightly E of farmstead. TCE & DCE converting to VC (67 ug/L)(2019)
MW-41D	x	x			136’	Slightly SE of farmstead. TCE converting to DCE (2009).
MW-42D	x	x			148’	Slightly SE of farmstead. TCE decreasing (2008).
MW-43D	xx				159’	NW corner of farmstead. TCE increasing (2019).
MW-44D	xx				146’	NE of farmstead. VC increasing (2019)
MW-45D	xx		x		138’	Out in field E of farmstead pretty far. Eroded soil under concrete seal. VC & TCE increasing (2019)
MW-46D					129’	W of site. Low TCE & VC (2019)
INJ-1				x	174’	Next to MW30D. Damaged steel & PVC casing can be moved easily. 17’ shallower than expected.
INJ-2				x	188?	Next to MW-41D. Obstruction 6” deep (extra layers of PVC/steel inside casing)
INJ-3				x	168’	Near INJ-2. 18’ shallower than expected.
INJ-4				x	168’	Next to MW-4. Damaged casing (dented/cracked). 21’ shallower than expected.
INJ-5				x	171’	Center of site. 22’ shallower than expected. Animal burrow next to well.
INJ-6					182’	NE corner of farmstead. **Inject?**
INJ-7					184’	NE corner of farmstead. **Inject?**
INJ-8					153’	SW portion of farmstead. **Inject?**
INJ-9					153’	NW portion of farmstead. **Inject?**
TW-1				x	176’	Middle of farm field. Sampled once in 2000. Low petroleum detects. 6” Steel casing w/ outer PVC protection. 57 gallons=1 well volume. 25’ screen.
RW-1				x	148’	Inside farmstead to east. 24’ shallower than expected.

RW-2				x	168?	East tree line. Wires blocked depth of well measurement.

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