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NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
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STATE OF NEVADA
Department of Conservation & Natural Resources
DIVISION OF ENVIRONMENTAL PROTECTION

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February 21, 2014

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Los Angeles, CA 90017

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c/o Franklin H. Levy
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88 Black Falcon Avenue
Boston, MA 02210

SBIC
c/o Jeffrey T. Oberman
Levin & Oberman
361 N. Canon Dr.
Beverly Hills, CA. 90210

Subject: **Fourth Quarter 2013 Groundwater Monitoring and Sampling Report**

Facility: Al Phillips the Cleaner (former)
3661 S. Maryland Parkway
Las Vegas, Nevada
Facility ID: **H-000086**

Dear Messrs. Kishner, Swickard, Levy and Oberman:

The Nevada Division of Environmental Protection (NDEP) received the ***Fourth Quarter 2013 Groundwater Monitoring and Sampling Letter Report*** prepared by Cardno ATC Associates, Inc. (Cardno ATC) on behalf of the Herman Kishner Trust (Trust) and Maryland Square Shopping Center, LLC (MSSC LLC), dated January 28, 2014 and received in hard copy on January 31, 2014.

Overview of Reported Results

The Fourth Quarter Report provides the analytical data for groundwater samples collected from 49 individual, multi-level, and nested wells across the site. Three new monitoring wells (MW-41, MW-42 and MW-43) that were installed and sampled in the third quarter of 2013, were sampled again in the fourth quarter. Data from these three wells bound the extent of the tetrachloroethylene (PCE) plume to the north and to the east.

A new milestone was set in the fourth quarter, with the detection of 10,000 micrograms per liter (µg/L) of PCE in the groundwater sample collected from well MW-14I. This is the highest concentration of PCE ever reported for groundwater at the site. Well MW-14I has a 40-55 ft screened interval and lies on the east side of S. Maryland Parkway, directly opposite the former dry cleaners. Well MW-14I, along with MW-19I (34-54 ft screen), was installed in July 2012 to function as a pumping well for the aquifer tests. Initial samples from each well contained 7,200 (MW-14I) and 690 µg/L PCE (MW-19I).

Pilot Testing: Potassium Permanganate ($KMnO_4$) and Pulse-Ox Injections

Potassium permanganate injections (nearly 20,000 gallons injected between March 11 through 20, 2013) were performed as part of the pilot testing on the eastern parking lot of the Mall. Well MW-19I and nested wells MW-19D1 through 19D3 are located in the vicinity of oxidant injections performed as part of the pilot testing (see **Attachment 1** to this letter).

Following injections of potassium permanganate ($KMnO_4$), concentrations of PCE in MW-19I declined from 710 µg/L to nondetectable (<0.50 µg/L); however, concentrations of PCE in deep well MW-19D3 (92-102 ft screen) showed a large increase, from 0.68 µg/L to 710 µg/L over the same time period. These data suggest that the 20,000 gallons of $KMnO_4$ solution injected nearby may have displaced the PCE plume to greater depths.

The fourth-quarter sample from MW-19D3 showed that the concentration of PCE is still elevated when compared with data collected before the injections. Taken as a whole, these data show why any remediation technology that uses injection must be carefully designed to avoid displacing the contaminated groundwater into previously clean areas, laterally or vertically.

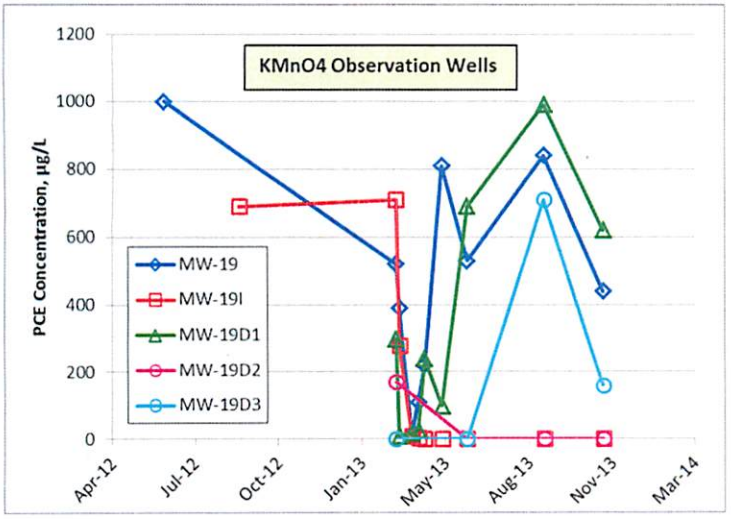
Two sets of multi-depth wells were used to evaluate the results of the Pulse-Ox pilot testing: nested wells MW-20D1, MW-20D2, and MW-20D3, and multi-level wells MW-40 CMT-30 to CMT-60 (the CMT wells have 6-inch screened intervals to provide detailed information on the vertical distribution of PCE). A summary of pre-test and post-test concentrations of PCE in the observation wells for $KMnO_4$ and Pulse-Ox is provided below:

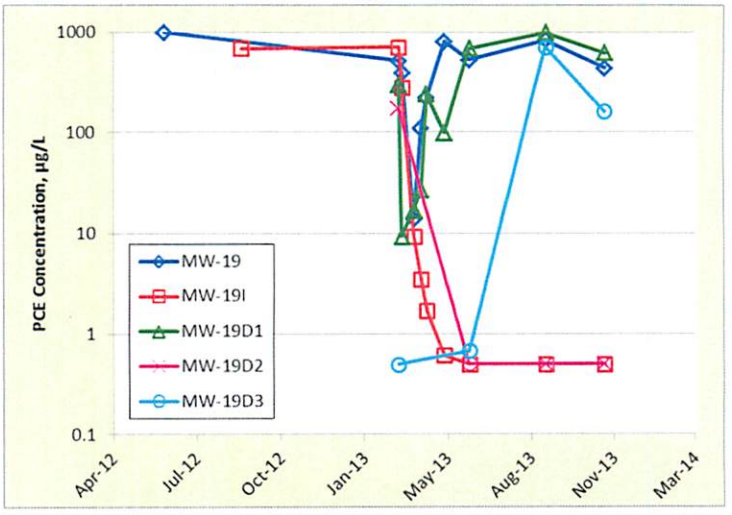
Well	Well Location	Screen Depth (feet bgs)	Pre-test PCE Levels (immediately before pilot testing)	Post-test PCE Levels
Observation Wells for Potassium Permanganate Testing				
MW-19	15 ft upgradient of injection	19 to 34 ft	1,000 µg/L	520 to 840 µg/L
MW-19I	25 ft downgradient of injection	30 to 50 ft	700 µg/L	0.50 µg/L
MW-19D1	10 ft crossgradient of injection	31 to 51 ft	300 µg/L	690 to 990 µg/L
MW-19D2	10 ft crossgradient of injection	60 to 70 ft	170 µg/L	<0.50 µg/L
MW-19D3	10 ft crossgradient of injection	92 to 102 ft	0.50 µg/L	710 µg/L
Observation Wells for Pulse-Ox Testing				
MW-20	15 ft upgradient of injection	19 to 35 ft	290 µg/L	470 to 850 µg/L
MW-20D1	8 ft crossgradient of injection	25 to 45 ft	69 µg/L	3.6 to 260 µg/L
MW-20D2	8 ft crossgradient of injection	55 to 65 ft	25 µg/L	1.1 to 210 µg/L
MW-20D3	8 ft crossgradient of injection	90 to 100 ft	0.66 µg/L	<0.50 to 62 µg/L
MW-CMT	27 ft downgradient of injection	30-30.6 ft	4.7 µg/L	0.86 to 10 µg/L
MW-CMT	27 ft downgradient of injection	35-35.6 ft	48 µg/L	2.3 to 12 µg/L
MW-CMT	27 ft downgradient of injection	40-40.6 ft	270 µg/L	37 to 150 µg/L
MW-CMT	27 ft downgradient of injection	45-45.6	310 µg/L	47 to 120 µg/L
MW-CMT	27 ft downgradient of injection	50-50.6	280 µg/L	24 to 120 µg/L
MW-CMT	27 ft downgradient of injection	55-55.6	390 µg/L	38 to 570 µg/L
MW-CMT	27 ft downgradient of injection	60-60.6	1200 µg/L	20 to 1400 µg/L

µg/L = micrograms per liter; bgs = below ground surface

Potassium Permanganate – 6 Months after Pilot Testing

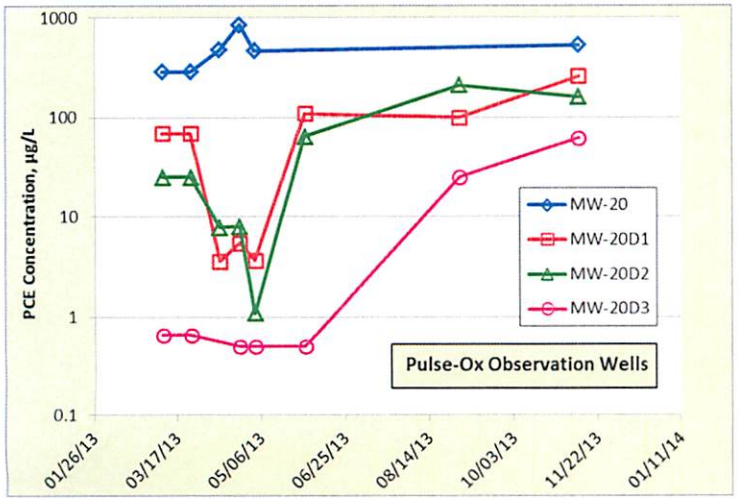
Data from observation wells suggest that displacement may have produced results that initially appeared successful in decreasing concentrations of PCE in groundwater. The longer-term, post-testing data from MW-19D3 appears to show that the mass of injectate pushed the plume deeper into previously uncontaminated layers. Six months after the pilot testing, concentrations of PCE are lower in two wells, higher in two wells, and largely unchanged in one well. The downgradient well, MW-19I showed decreased concentrations, as did one of the crossgradient wells (MW-19D2).

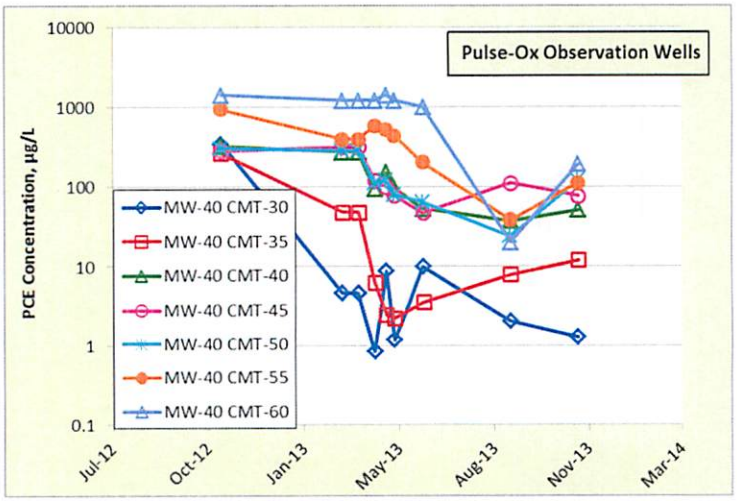




Pulse-Ox – 6 Months after Pilot Testing

Two sets of multi-depth wells were used to evaluate the results of the Pulse-Ox pilot testing. Wells MW-20 (upgradient) and MW-20D1 through MW-20D3 (crossgradient) all showed increased concentrations of PCE after 6 months. Downgradient wells of the MW-CMT series showed decreased concentrations overall, with only three of the seven wells rebounding to concentrations exceeding 100 µg/L. Before the Pulse-Ox testing, all seven CMT wells had concentrations of PCE that exceeded 100 µg/L.





The current data are somewhat ambiguous, and suggest the possibility that injections may promote the uncontrolled migration of contaminated groundwater. More time and monitoring may be needed to assess the actual longer-term results of the pilot tests.

Secondary Effects of In Situ Oxidation

In addition to the uncontrolled migration of oxidant and contaminated groundwater, use of in situ oxidation has the potential to oxidize and mobilize certain naturally occurring metals. The report addresses this concern, and provides data and discussion on the topic (see Table 3 in the subject report). Downgradient wells show increased and elevated concentrations of manganese, total chromium, and hexavalent chromium. Concentrations of arsenic in groundwater do not appear to be affected by the pilot testing.

The federal drinking water standard for chromium is 100 µg/L, and applies to both chromium-III and chromium-VI; the NDEP has adopted these standards. Two of the downgradient wells (MW-19I and MW-40 CMT-30 exceed the standards for chromium. (Note: the subject report misstates the NDEP's level of 100 µg/L for hexavalent chromium, as 110 µg/L. See: https://ndep.nv.gov/bmi/docs/bcl_calculations_august_2013.pdf which is cited in the subject report as the source of the NDEP's action level.)

Increased concentrations of manganese are expected where potassium permanganate is the oxidant; however, there are no health-based federal standards for manganese. The secondary standard of 50 µg/L is based on aesthetic qualities, such as color and taste. Seven wells downgradient of the pilot test injections exceed this secondary standard.

Vertical Gradients

Data from well pairs were used to evaluate vertical gradients at the location of each well pair. Of the nine well pairs evaluated, six showed upward vertical gradients (0.0008 to 0.0729) and three showed downward vertical gradients (0.0409 to 0.1930). It is unclear if vertical gradients have influenced migration of the dissolved-phase PCE; however, any pure-phase PCE released at the source would migrate downward based on density alone.

Mann-Kendall Trend Test

Results from the Mann-Kendall trend test (see Table 2 and Appendix C) indicate that concentrations of PCE appear to be decreasing in many wells across the site. However, the test results show **increasing** (>95% confidence), **probably increasing** (>90% confidence) and "generally upward" (i.e., positive "S" value and confidence >80%) trends in concentration for several wells close to the source area (MW-3, **MW-5, MW-6**, MW-6D3, and **MW-7**), east of Boulevard Mall (MW-19D3, MW-20D1, MW-20D2, MW-20D3, and for some wells east of or near the golf course (MW-27, MW-31, and **MW-38**).

Sampling Frequency

In response to the NDEP's letter of December 4, 2013, the report makes some recommendations to modify the sampling frequency for site wells. These recommendations are based on the number of samples and results of the trend analysis. Specifically, a decreased sampling frequency was recommended if there were at least 8 samples with data showing a decreasing trend.

The NDEP has evaluated the proposed sampling schedule and notes that concentrations of PCE are relatively low in wells MW-7 and MW-9, so even though the test shows a trend of increasing concentration in MW-7, this doesn't merit quarterly sampling. Samples from MW-7 and MW-9 have shown concentrations of PCE less than

15 µg/L since 2008, so semi-annual sampling should be sufficient for these two wells. Additionally, MW-27 can go to semi-annual monitoring, based on recent results of the trend tests. That reduces the annual number of proposed samples by six; however, due to locations within the neighborhood and results of the trend tests, the NDEP requests that wells MW-6D3, MW-13, MW-14, MW-19, MW-20D1, MW-20D3, MW-23, MW-25, MW-26, and MW-32 be added to third-quarter sampling (i.e., semi-annual sampling of these wells). The NDEP's requested reductions and additions result in a net addition of four samples per year above what the report proposed but, by the NDEP's count, 39 fewer samples per year than the current sampling schedule.

NDEP Requirements

1. Sampling Frequency – The NDEP concurs, with minor modifications, to the proposed sampling schedule (see Attachment 2)
2. Three Daily Blank Samples – The NDEP concurs, but requests that these three blank samples still be collected on the last day of sampling during the first quarter of each year.
3. Remediation Monitoring – The NDEP concurs that the monitoring schedule may change after the remedy is installed/activated.
4. Tracer Testing – The NDEP had requested tracer testing to evaluate the integrity of the well seals in the nested wells, MW-19D1, MW-19D2 and MW-19D3, or that the Trust propose another method to test integrity of the well seals in this set of nested wells. The report notes that options are being evaluated.
5. The NDEP requests that vertical gradients continue to be calculated when and where possible. Evaluate whether gradients change over time and discuss results and potential significance of these results in the quarterly reports
6. The NDEP appreciates the application and summary of the trend testing; please continue to conduct this statistical analysis.
7. The First Quarter 2014 Groundwater Monitoring Report is due by **April 30, 2014.**

If you have any questions or require additional information regarding this letter, contact me by telephone at (775) 687-9496 or e-mail at msiders@ndep.nv.gov

Sincerely,

Mary A. Siders, Ph.D.
Bureau of Corrective Actions
Fax (775) 687-8335

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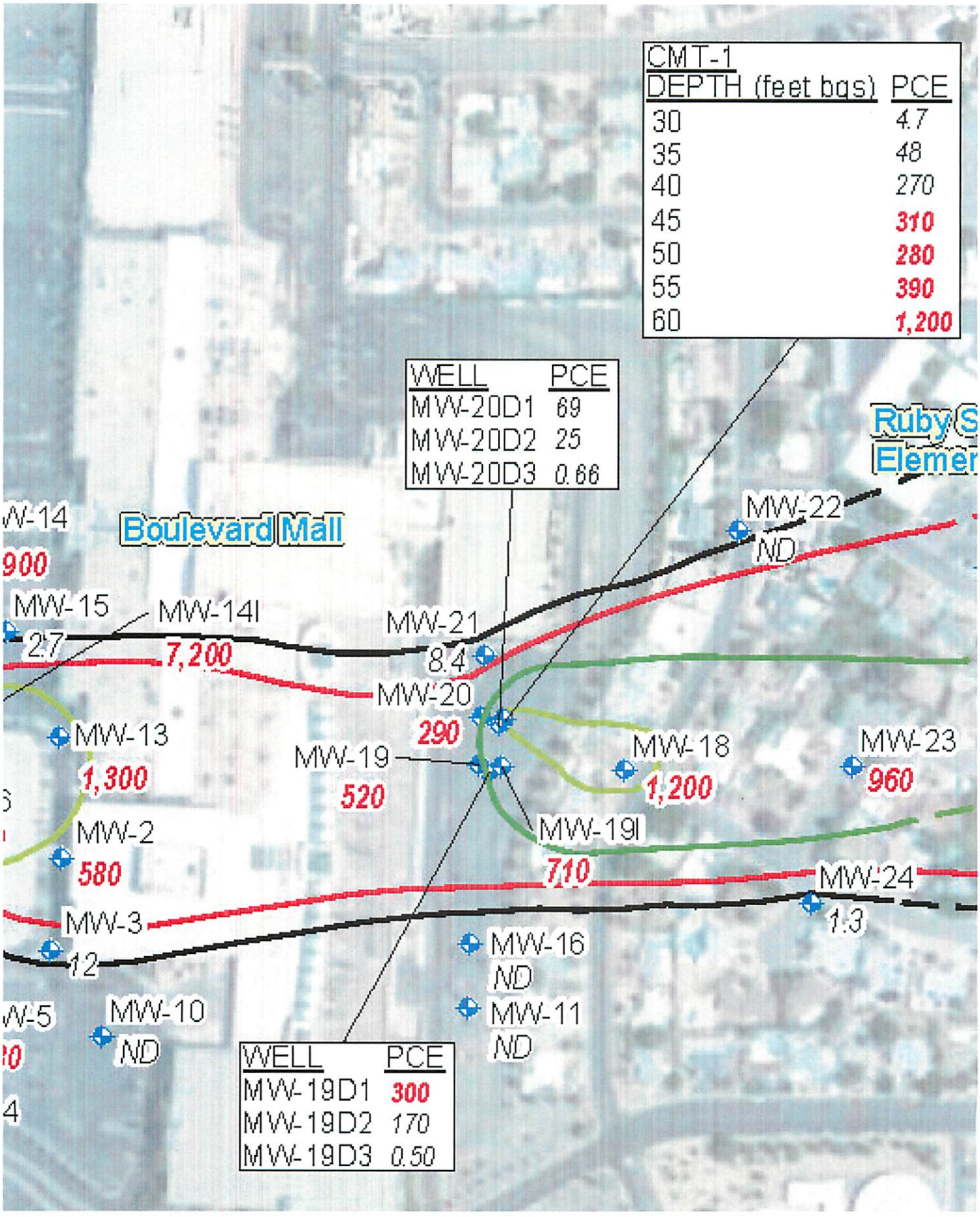
ATTACHMENT 1 – Location of Wells in the Vicinity of Pilot Test Injections.
(NDEP Comment Letter, February 21, 2014)



ATTACHMENT 2 – Current and Proposed Schedule for Sampling Monitoring Wells

2013

Q1-2013	Q2-2013	Q3-2013	Q4-2013
MW-1	MW-1	MW-1	MW-1
MW-2	MW-5	MW-5	MW-2
MW-3	MW-6	MW-6	MW-5
MW-5	MW-9	MW-9	MW-6
MW-6	MW-14	MW-14	MW-7
MW-7	MW-17	MW-17	MW-8
MW-8	MW-27	MW-34	MW-9
MW-9	MW-34	MW-35	MW-12
MW-10	MW-35	MW-36	MW-13
MW-11	MW-36	MW-37	MW-14
MW-12	MW-37	MW-38	MW-17
MW-13	MW-38	MW-39	MW-18
MW-14	MW-39	MW-14I	MW-19
MW-15	MW-14I	MW-19I	MW-20
MW-16	MW-19I	MW-6D1	MW-23
MW-17	MW-6D1	MW-6D2	MW-25
MW-18	MW-6D2	MW-6D3	MW-26
MW-19	MW-6D3	MW-19D1	MW-27
MW-20	MW-19D1	MW-19D2	MW-30
MW-21	MW-19D2	MW-19D3	MW-31
MW-22	MW-19D3	MW-20D1	MW-32
MW-23	MW-20D1	MW-20D2	MW-33
MW-24	MW-20D2	MW-20D3	MW-34
MW-25	MW-20D3	MW40-CMT-30	MW-35
MW-26	MW40-CMT-30	MW40-CMT-35	MW-36
MW-27	MW40-CMT-35	MW40-CMT-40	MW-37
MW-28	MW40-CMT-40	MW40-CMT-45	MW-38
MW-29	MW40-CMT-45	MW40-CMT-50	MW-39
MW-30	MW40-CMT-50	MW40-CMT-55	MW-41
MW-31	MW40-CMT-55	MW40-CMT-60	MW-42
MW-32	MW40-CMT-60		MW-43
MW-33			MW-14I
MW-34			MW-19I
MW-35			MW-6D1
MW-36			MW-6D2
MW-37			MW-6D3
MW-38			MW-19D1
MW-39			MW-19D2
MW-40			MW-19D3
MW-14I			MW-20D1
MW-19I			MW-20D2
MW-6D1			MW-20D3
MW-6D2			MW40-CMT-30
MW-6D3			MW40-CMT-35
MW-19D1			MW40-CMT-40
MW-19D2			MW40-CMT-45
MW-19D3			MW40-CMT-50
MW-20D1			MW40-CMT-55
MW-20D2			MW40-CMT-60
MW-20D3			
MW40-CMT-30			
MW40-CMT-35			
MW40-CMT-40			
MW40-CMT-45			
MW40-CMT-50			
MW40-CMT-55			
MW40-CMT-60			

2014 - Proposed

Q1-2014	Q2-2014	Q3-2014	Q4-2014
MW-1	MW-1	MW-1	MW-1
MW-2	MW-5	MW-5	MW-5
MW-3	MW-6	MW-6	MW-6
MW-5	MW-7	MW-7	MW-7
MW-6	MW-9	MW-9	MW-9
MW-7	MW-18	MW-18	MW-18
MW-8	MW-27	MW-27	MW-27
MW-9	MW-38	MW-38	MW-38
MW-10	MW-41	MW-41	MW-41
MW-11	MW-42	MW-42	MW-42
MW-12	MW-43	MW-43	MW-43
MW-13	MW-14I	MW-14I	MW-14I
MW-14	MW-19I	MW-19I	MW-19I
MW-15	MW-6D1	MW-6D1	MW-6D1
MW-16	MW-19D1	MW-19D1	MW-19D1
MW-17	MW-19D2	MW-19D2	MW-19D2
MW-18	MW-19D3	MW-19D3	MW-19D3
MW-19	MW-20D2	MW-20D2	MW-20D2
MW-20	MW40-CMT-30	MW40-CMT-30	MW40-CMT-30
MW-21	MW40-CMT-45	MW40-CMT-45	MW40-CMT-45
MW-22	MW40-CMT-60	MW40-CMT-60	MW40-CMT-60
MW-23		*MW-6D3*	
MW-24		*MW-13*	
MW-25		*MW-14*	
MW-26		*MW-19*	
MW-27		*MW-20D1*	
MW-28		*MW-20D3*	
MW-29		*MW-23*	
MW-30		*MW-25*	
MW-31		*MW-26*	
MW-32		*MW-32*	
MW-33			
MW-34			
MW-35			
MW-36			
MW-37			
MW-38			
MW-39			
MW-41			
MW-42			
MW-43			
MW-14I			
MW-19I			
MW-6D1			
MW-6D2			
MW-6D3			
MW-19D1			
MW-19D2			
MW-19D3			
MW-20D1			
MW-20D2			
MW-20D3			
MW40-CMT-30			
MW40-CMT-35			
MW40-CMT-40			
MW40-CMT-45			
MW40-CMT-50			
MW40-CMT-55			
MW40-CMT-60			
>80% conf incrs	NDEP	*NDEP additions*	NDEP
>90% conf incrs	reductions		reductions

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