EXHIBIT 7

CAP Addendum

EXHIBIT 7

Addendum to Offsite Corrective Action Plan
For the Commingled MTBE Plume
Located Downgradient of the Former McCarran
International Airport Car Rental Facilities
Las Vegas, Nevada

Prepared for:

Nevada Division of Environmental Protection
Bureau of Corrective Actions
2030 East Flamingo Road, Suite 230
Las Vegas, Nevada 89119

Prepared by:

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September 27, 2018

Project No. 95-01-150

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Creating Solutions, Building Trust.

September 27, 2018 Project No. 95-01-150

Nevada Division of Environmental Protection
Bureau of Corrective Actions
2030 East Flamingo Road, Suite 230
Las Vegas, Nevada 89119

Attn: Mr. Ben Moan

Re: Addendum to Offsite Corrective Action Plan for the Commingled MTBE Plume, Downgradient of the Former McCarran International Airport Car Rental Facilities, Las Vegas, Nevada

Dear Mr. Moan:

Presented herewith is an addendum to the Offsite Corrective Action Plan for the commingled methyl tert-butyl ether (MTBE) plume in groundwater located downgradient from the former McCarran International Airport Car Rental facilities in Las Vegas, Nevada. Broadbent prepared the enclosed addendum on behalf of Avis Budget Car Rental, LLC.

Please do not hesitate to contact us if you should have any questions or require additional information.

Sincerely,
BROADBENT & ASSOCIATES, INC.

Jason Hoffman, CEM #1904 (exp. 1/26/19)
Associate Geologist

enclosures:

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Addendum to Offsite Corrective Action Plan for the Commingled MTBE Plume Located Downgradient of the Former McCarran International Airport Car Rental Facilities Las Vegas, Nevada

REVIEW AND APPROVAL:

JURAT: I, Jason Hoffman, hereby certify that I am responsible for the services in this document and for the preparation of this document. The services described in this document have been provided in a manner consistent with the current standards of the profession and to the best of my knowledge comply with all applicable federal, state and local statutes, regulation and ordinances.

______________________ **September 27, 2018**

Jason Hoffman, CEM #1904 (exp. 1/26/19) **Date**
Associate Geologist

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1.0 INTRODUCTION

Broadbent & Associates, Inc. (Broadbent) prepared this Addendum to the Offsite Corrective Action Plan for the Commingled MTBE Plume (the Offsite Plume) located downgradient from the former McCarran International Airport car rental facilities (Addendum). Broadbent prepared this Addendum on behalf of Avis Budget Car Rental, LLC, operator of the former Avis Rent A Car Facility at 5164 Rent-A-Car Road (Facility ID #8-00217). This Addendum amends the Off-Site Corrective Action Plan dated October 5, 2000, prepared jointly by Broadbent and URS Corporation.

East of Swenson Street, in the area near Wilbur and South Young Streets, the Offsite Plume continues to exhibit concentrations above the MTBE Oxygenated Fuel Corrective Action Policy level of 200 µg/L. The Nevada Division of Environmental Protection (NDEP) has requested that the former car rental agencies expedite progress toward case closure. The proposed remediation identified in this Addendum is designed with the objective of moving more expediently toward case closure through the implementation of this groundwater cleanup alternative to cost-effectively reduce methyl tertiary-butyl ether (MTBE) concentrations in the Offsite Plume.

2.0 UPDATE TO CONCEPTUAL SITE MODEL

Offsite remediation activities were performed at the former Howard Johnson motel from 2002 through 2013. The motel was formerly located between Paradise Road and Swenson Street, downgradient and offsite from the former car rental facilities, which were located on airport property. Pursuant to the September 5, 2013, *Work Plan for Howard Johnson Pilot Test, Trenching and Additional Assessment Activities, Former Payless Car Rental, 5175 Rent-A-Car Road, Facility ID #8-00006,* OGI Environmental LLC conducted an evaluation of potential upgrades for the off-site air sparge system. Full-scale implementation of the upgrades was not conducted, however. To date, no active remediation has been conducted east of Swenson Street.

The highest detected concentrations of MTBE and benzene in the Offsite Plume during the Fourth Quarter 2017 are summarized in the table below.

Area	Representative Well ID	Location	MTBE Concentration 4Q 2017 (µg/L)	Benzene Concentration 4Q 2017 (µg/L)
Offsite Plume	OMW-73-57	Downgradient residential area (2,400 to 3,300 feet downgradient from Avis/National/Payless source areas)	1,400	<2.0
	OMW-43-60	Downgradient residential area (2,750 to 3,650 feet downgradient from Avis/National/Payless source areas)	1,400	<2.0

The Offsite Plume is approximately 3.5 acres in size and underlies several residential neighborhoods at depths ranging from approximately 45 to 70 feet below ground surface (bgs). The vertical thickness of the Offsite Plume is approximately 15 feet at its trailing edge. The Offsite Plume thins to approximately 10 feet at its leading edge. The location of the Offsite Plume is shown on Figure 1.

Historical data collected by the Facilities and presented to NDEP in electronic format by CE2 Corporation (concentration trend graphs, plume maps, etc.) and other analyses presented at NDEP "All Facilities" meetings suggest that concentrations in the Offsite Plume have been decreasing over time. In addition, the Offsite Plume has been slowly decreasing in size.

A Mann Kendall analyses worksheet prepared by Broadbent for seven wells located within the Offsite Plume is attached in Appendix A. As depicted on the worksheet, the majority of wells are decreasing or probably decreasing, with exception to well OMW-79-52, located at the leading edge of the Offsite Plume, which is increasing.

An analysis of four years of MTBE concentrations from selected wells near the interpreted location of the trailing edge of the Offsite Plume was conducted and is presented in the table below.

Date	OWM-72-59 Average MTBE Concentration (µg/L)	OMW-73-57 Average MTBE Concentration (µg/L)	OMW-74-61 Average MTBE Concentration (µg/L)	OMW-75-61 Average MTBE Concentration (µg/L)
2014	2,200	2,200	2,100	1,400
2015	2,150	2,100	1,130	1,250
2016	1,550	1,105	1,600	1,015
2017	1,300	1,450	1,105	1,045
Average Yearly Reduction	15%	16%	13%	19%

For the previous four years, MTBE concentrations within the trailing edge of the Offsite Plume have demonstrated an average yearly reduction of 16%.

The future rates of MTBE migration are uncertain. Source area remedial activities at the National, Avis, and Payless facilities are projected to be discontinued by the end of 2019. The source area cleanup efforts increased dissolved oxygen (DO) concentrations in groundwater. DO concentrations greater than 1.0 mg/L are typically needed for aerobic biodegradation of petroleum compounds, including MTBE. Post-remediation, it is likely that groundwater conditions will be anaerobic. Biodegradation of MTBE occurs at much more slowly in anaerobic conditions.

3.0 REMEDIAL OPTIONS EVALUATION

Broadbent evaluated remedial options considered potentially feasible for the site. An insitu remedial approach was selected for further evaluation, due to cost constraints and access limitations. Injected oxidizers, such as ozone, hydrogen peroxide, or proprietary chemical mixes created by various manufacturers, are effective at breaking down hydrocarbons and MTBE. However, these oxidizing reactions may consume naturally occurring carbon sources in addition to petroleum, and accordingly may require intensive application in order to continue breaking down hydrocarbons and MTBE. Contact time and radius of influence may be limiting factors of these technologies. Manufacturer-suggested use of a five-foot radius of influence for injection points is not uncommon, especially for point treatment (i.e., all infrastructure installed in one well vault). Given the size of the Offsite Plume and assumed access via public right-of-ways, it is apparent that direct oxidation may not be the most feasible option.

However, the use of a technology that utilizes natural plume dynamics for dispersion, such as application of remedial technologies that promote and encourage natural biodegradation, appear to be a viable remedial option within the Offsite Plume. The effectiveness of these technologies is also limited by how well the applied products can be spread out across the plume. However, these technologies that promote and encourage the growth and reproduction of natural microbes that consume and degrade hydrocarbons, and do not rely on physical destruction (i.e., oxidation) of hydrocarbons, can expand much further from remediation points. Given that the estimates on groundwater seepage velocities approach 375 feet per year, the use of technologies that enhance biodegradation are even more promising as a feasible remedial option.

4.0 REMEDIAL FEASIBILITY INVESTIGATION

The following sections detail Broadbent's implementation of tests conducted to evaluate the feasibility of using enhanced biodegradation as a remedial alternative for the Offsite Plume.

4.1 Bacterial Enumeration and Nutrient Assays

Aerobic heterotrophic bacteria are generally desired for natural biodegradation of dissolved petroleum hydrocarbons. To evaluate for the presence of these bacteria, three groundwater wells were chosen from within the Offsite Plume: OMW-73-57, located at the trailing edge of the Offsite Plume; OMW-43-60, located in the middle of the Offsite Plume; and OMW-79-52, located at the leading edge of the Offsite Plume. Groundwater samples were collected from these wells and were submitted to the Department of Chemistry and Biochemistry at the California State University, Chico for bacterial enumeration and nutrient assays, under the direction of CytoCulture International, Inc. (CytoCulture), an environmental biotechnology firm. The following is a summary of the analyses and the full laboratory report is included in Appendix B.

- Bacterial population densities suggest that active degradation is occurring in the Offsite Plume. Overall aerobic heterotrophic bacteria are high at 4,000 colony forming units (cfu) per ml in OMW-73-57 at the trailing edge of the Offsite Plume, and it appears that most of those bacteria are consuming petroleum hydrocarbons and reproducing (based on a subsequently high subpopulation analysis of 2,500 cfu per ml). While lower densities of aerobic heterotrophic bacteria were identified at the other two sampling locations, the populations were still considered significant.

- The bacteria are facultative bacteria that can survive on anaerobic respiration when DO concentrations are less than 1.0 mg/L but will be limited in their ability to biodegrade petroleum hydrocarbons in those conditions. DO concentrations in the Offsite Plume are low, typically less than 1.0 mg/L, suggesting that DO is a limiting factor.

- Nutrient levels within the Offsite Plume were found to be slightly depleted in the heart of the Offsite Plume (i.e., <1.0 mg/L) at the time of the analysis (ammonia nitrogen, nitrate nitrogen, and phosphate were analyzed).

- The analysis concluded that a sufficient bacterial population density exists in the Offsite Plume to biodegrade dissolved petroleum hydrocarbons in groundwater and petroleum hydrocarbons adsorbed to soil particles. However, the introduction of dilute nutrient solutions and increases to DO concentrations would accelerate the rate of aerobic biodegradation within the Offsite Plume.

4.2 Historical Site-Wide Plume Microbiology

In order to evaluate historical site-wide plume microbiology trends in support of the findings of the bacterial enumeration and nutrient assays (as presented in Section 4.1), historical MTBE concentrations were tabulated and plotted against DO, oxidation reduction potential, nitrate, and sulfate for a selection of wells from the source areas, from downgradient of the source areas, and from the Offsite Plume. The tables and plots are included in Appendix C. The following is a summary of the evaluation.

- Active remediation has been performed site-wide utilizing a variety of technologies, most of which involved, in whole or in part, increasing DO concentrations to promote biological activity. Groundwater wells located in the source areas where DO-increasing remedial activities occurred (AVMW-50-65, AVMW-66-50) and groundwater wells located downgradient from these remediation systems (HJMW-75-40, OMW-48-45) have historically been observed to have decreasing petroleum hydrocarbon concentrations during times of higher DO.

- Nitrate concentrations appear to be historically depleted in the source area (AVMW-50-65, AVMW-66-50), suggesting that nitrates were depleted during anerobic conditions (i.e., low DO). However, in the Offsite Plume, nitrate concentrations suggest there is potential for anaerobic biodegradation, but MTBE concentrations suggest that the rate of that degradation is insignificant.

- Sulfate concentrations appear to be historically lower in the source area and downgradient of the source area (<250 mg/L to 500 mg/L) and the highest in the Offsite Plume (>1,000 in OMW-43-60, OMW-73-57, and OMW-79-52), which also suggests that there may not be significant anaerobic activity occurring in the Offsite Plume.

4.3 Summary of Nutrient-Enhanced Bioremediation Remedial Feasibility

The bacterial enumeration conducted on groundwater samples collected from within the Offsite Plume found sufficient bacterial population densities to biodegrade petroleum hydrocarbons and a subpopulation analysis suggested that the bacteria were actively consuming petroleum hydrocarbons and reproducing. Nutrient assays suggested that the Offsite Plume is somewhat nutrient limited in the heart of the Offsite Plume. Both the bacterial enumeration and the historically collected data suggest that DO is limiting bacterial growth. Sufficient concentrations of nitrate and sulfate appear in the Offsite Plume for aerobic biodegradation, but MTBE trends suggest that the rate of degradation is insignificant. Based on the analyses, enhanced DO concentrations would likely accelerate the rate of aerobic biodegradation within the Offsite Plume. Nutrients appear to play a lesser role in limiting aerobic biodegradation;

however, nutrients in the heart of the Offsite Plume are slightly low and increasing the nutrient concentrations would also likely accelerate the rate of biodegradation.

5.0 WORK PLAN & SCHEDULE

The following sections provide an overview of the work plan, details on how the work plan will be implemented (e.g., well construction, remediation procedures, etc.), and the schedule for implementation.

5.1 Work Plan Overview

Broadbent proposes the installation of two transects of remediation wells within the Offsite Plume and the subsequent use of Provectus® Oxygen Release Substrate™ (ORS) sleeves in each remediation well. As with other oxygen releasing compound technologies, the ORS sleeves are filled with a blend of materials that provide a continuous source of DO to the bacterial population within the groundwater plume (via calcium peroxide). However, the ORS sleeves also incorporate an additional component of a proprietary blend of inorganic nutrients (e.g., nitrogen and phosphorus) to provide additional supplements in support of bacterial population growth. At a ratio of 80:20 (80% ORS, 20% nutrients), the main focus of the ORS sleeves will be to increase DO within the Offsite Plume, which has been demonstrated to be a limiting factor for aerobic biodegradation site-wide. As the Offsite Plume was found to be slightly limited in nutrients in the heart of the plume, the additional nutrients should provide beneficial nutrients to those areas, further accelerating natural biodegradation. The ORS sleeves also incorporate a buffer to enhance the effective life of the product (estimated at 3 to 6 months) before a sleeve change-out is needed. With the high seepage velocities found across the site (up to 375 feet per year), the ORS sleeves are anticipated to quickly raise DO and nutrient levels downgradient from the remediation wells and accelerate the rates of natural biodegradation of dissolved petroleum hydrocarbons. A technical data sheet for the ORS product is included in Appendix D.

Fifteen remediation wells are proposed for installation within the Offsite Plume (see Figure 2). Eleven of these remediation wells are proposed to be installed along Wilbur Street near the trailing edge of the Offsite Plume. Four additional remediation wells are proposed to be installed in LuLu Circle, located in the middle of the Offsite Plume, approximately 350 feet downgradient from the first line of remediation wells. Each remediation well is proposed to be constructed of four-inch Schedule 40 PVC, installed to 65 feet bgs, with 20 feet of screen (65 to 45 feet bgs). The subsurface hydrogeology of the Offsite Plume has been characterized and documented during the completion of the *Hydrogeologic Conceptual Site Model Report (draft)* dated August 28, 2018 (prepared by Geo Blue Consulting, Inc.). The remediation wells will be targeting the coarser layers depicted on the hydrogeologic cross sections in the Offsite Plume in order to better disseminate remedial materials into the Offsite Plume. The hydrogeologic cross sections are included in Appendix E (refer to cross-sections A, H, and I). The wells are proposed to be spaced 20 feet apart to optimize the delivery of remedial materials laterally across the Offsite Plume.

5.2 Work Plan Implementation

The following tasks are required to implement the work plan for the Offsite Plume.

Utility Clearance Coordination

This task consists of the coordination of utility clearance by a licensed utility locating contractor using ground penetrating radar. Post utility clearance, the chosen drilling locations will be hand cleared to 6.5 feet bgs. As the proposed location of the remediation wells are located within right-of-ways with subsurface utilities, this due diligence is essential for protection of subsurface infrastructure and workers.

Soil Boring Advancement

Fifteen soil borings (preliminarily designated PRW-1 through PRW-15) will be drilled using hollow stem auger to a depth of approximately 65 feet bgs at the chosen locations. During boring advancement, field observations (e.g., photoionization detector (PID) readings, staining, odor, etc.) and boring lithology will be recorded by a qualified Broadbent field geologist. Soil samples are not proposed for collection during drilling.

Remediation Well Installation

The soil borings will be completed as remediation wells RW-1 through RW-15. The wells will be built with Schedule 40 PVC with 20 feet of factory slotted pipe (0.020-inch slots) from the total depth of 65 feet bgs to approximately 45 feet bgs and blank casing will extend from approximately 45 feet bgs to near ground surface. A clean wash filter pack compatible with the 0.020-slot screen will be placed in the annulus between the pipe and boring wall to approximately two feet above the screen. A bentonite seal will be placed above the filter pack. The remediation well will be completed by setting grout above the bentonite seal to the top of the boring. The well will be protected at the surface with a manhole set flush with grade. All soil cuttings will be placed in a roll off bin and stored temporarily near the drilling locations.

Following construction, and after allowing for a minimum of 48 hours for the well seal to cure, the remediation wells will be hydrologically developed by bailing until relatively silt-free water is recovered. Development equipment will be cleaned (decontaminated) prior to use in the wells. Development water will be placed in sealed 55-gallon drums and stored temporarily on the former Avis facility.

The remediation wells are not proposed to be surveyed by a licensed surveyor. However, a hand-held GPS device will be utilized to record their locations in North American Datum 83 (NAD 83) so that their locations can used in future drawings and in the electronic database maintained by CE2 Corporation.

Disposal of Soil Cuttings and Purge / Development Water

Soil cuttings and groundwater generated during well construction and development activities will be stored in roll off bins and in 55-gallon drums in accordance with applicable regulations. Upon receipt of waste profile results, Broadbent will arrange for the proper disposal of the soil cuttings and development water with a licensed contractor.

ORS Sleeve Installation

ORS sleeves will be installed into 3-foot screened PVC cannisters designed to be installed in 4-inch wells (i.e., cannisters with 3.5-inch outer diameters). For each location, two PVC cannisters will be stacked in series (two to three feet of vertical separation) in order to increase the vertical zone of influence. The ORS sleeves will target an approximate 10-foot vertical zone of the Offsite Plume at each location, and the installed depth will be separately chosen for each remediation well based on MTBE concentration elevations in adjacent clustered monitoring wells and the elevations of coarser layers. The ORS sleeves will be changed out approximately every 3 months, depending on the results (see *Monitoring the Effectiveness*, below), and treatment is anticipated for a total of 12 months.

Monitoring the Effectiveness of Remediation

DO concentrations in the remediation wells and nearby monitoring wells will be measured using a downhole probe (or flow cell with low-flow sampling techniques) prior to the installation of the ORS sleeves and approximately one week after installation. Based on the manufacturer's specifications, resulting groundwater DO concentrations in the wells are dependent on flow and the amount of biological activity consuming DO; however, concentrations should be significantly higher than background. DO concentrations will be measured in the remediation wells on a monthly basis for the first 6 months of deployment. After one month of successful DO enhancement in the remediation wells, DO concentrations will be measured in monitoring wells located downgradient from the remediation wells. DO concentrations in the downgradient monitoring wells will then continue to be measured on a monthly basis using a downhole probe. In general, downhole DO measurements will be taken at depths corresponding to the coarser layers where higher groundwater flow is anticipated.

Monitoring well OMW-73-57, located at the trailing edge of the Offsite Plume, OMW-43-60, located in the middle of the Offsite Plume, and OMW-79-52, located at the leading edge of the Offsite Plume will be sampled quarterly (six sampling events) to evaluate the effectiveness of the ORS sleeves. Monitoring wells will be sampled for benzene, toluene, ethylbenzene, total xylenes (BTEX), MTBE, and tertiary-butyl alcohol (TBA) using EPA Method 8260B, and for total aerobic hydrocarbon degrading bacteria, total aerobic heterotrophic bacteria, pH, ammonia as N, nitrate as N, and orthophosphate (bacterial enumeration and nutrient assays). The remainder of monitoring wells in the Offsite Plume will continue to be sampled on a biannual basis, per the existing NDEP-approved sampling plan. Adjustments to the oxygenation approach (e.g., longer stacks, reduced or more frequent sleeve change outs, etc.) may be made based on the results of the groundwater sampling.

Report Preparations

The results of the drilling, including lithologic logs of the well borings with the well design and final configuration, details regarding the first ORS sleeve deployment event, and any other pertinent information will be provided to NDEP upon completion. Subsequent reports will be prepared quarterly during the year of remediation events and will document ORS sleeve change outs, sampling results, and any changes to the ORS sleeve deployments. Evaluations of groundwater flow rates (based on observed DO migration), the mass of applied ORS product, and the total mass of the Offsite Plume will also be included in the reports. If it appears that alternative methods of applying oxygenating materials to the Offsite Plume utilizing the installed network of remediation wells would be beneficial, such recommendations may also be included in these reports.

5.3 Project Schedule

Remedial activities were completed in the Avis Source Area in December 2014 and are ongoing in the Payless Source Area, although the Payless system was turned off in December 2017. Remedial activities targeting the remaining MTBE concentrations in the vicinity of the National Source Area are pending and are expected to be on-line by the end of 2018 and continue through the end of 2019. Cleanup of the offsite plume is intended to occur concurrent with remedial activities conducted at the National facility. Upon approval of this work plan, a Not-To-Exceed Proposal (NTEP) will be prepared for NDEP review. Upon approval of the NTEP, the implementation of this work plan will commence. It is anticipated that the first deployment of ORS sleeves would occur in January 2019 and be completed (i.e., all ORS sleeves removed) in January 2020.

6.0 LIMITATIONS

The findings presented in this report and electronic submissions from CE2 Corporation are based upon observations of field personnel, points investigated, results of laboratory tests performed by Veritas Laboratories and the California State University, Chico, and our understanding of Nevada Administrative Code. Our services were performed in accordance with the generally accepted standard of practice at the time the electronic data was submitted and that this report was written. No other warranty, expressed or implied was made. This report has been prepared for the exclusive use of Avis Budget Group, Inc. It is possible that variations in soil or groundwater conditions could exist beyond points explored in this investigation. Also, changes in site conditions could occur in the future due to variations in rainfall, temperature, regional water usage, or other factors.

FIGURES

Figure 1 Site Map with Fourth Quarter 2017 MTBE Results

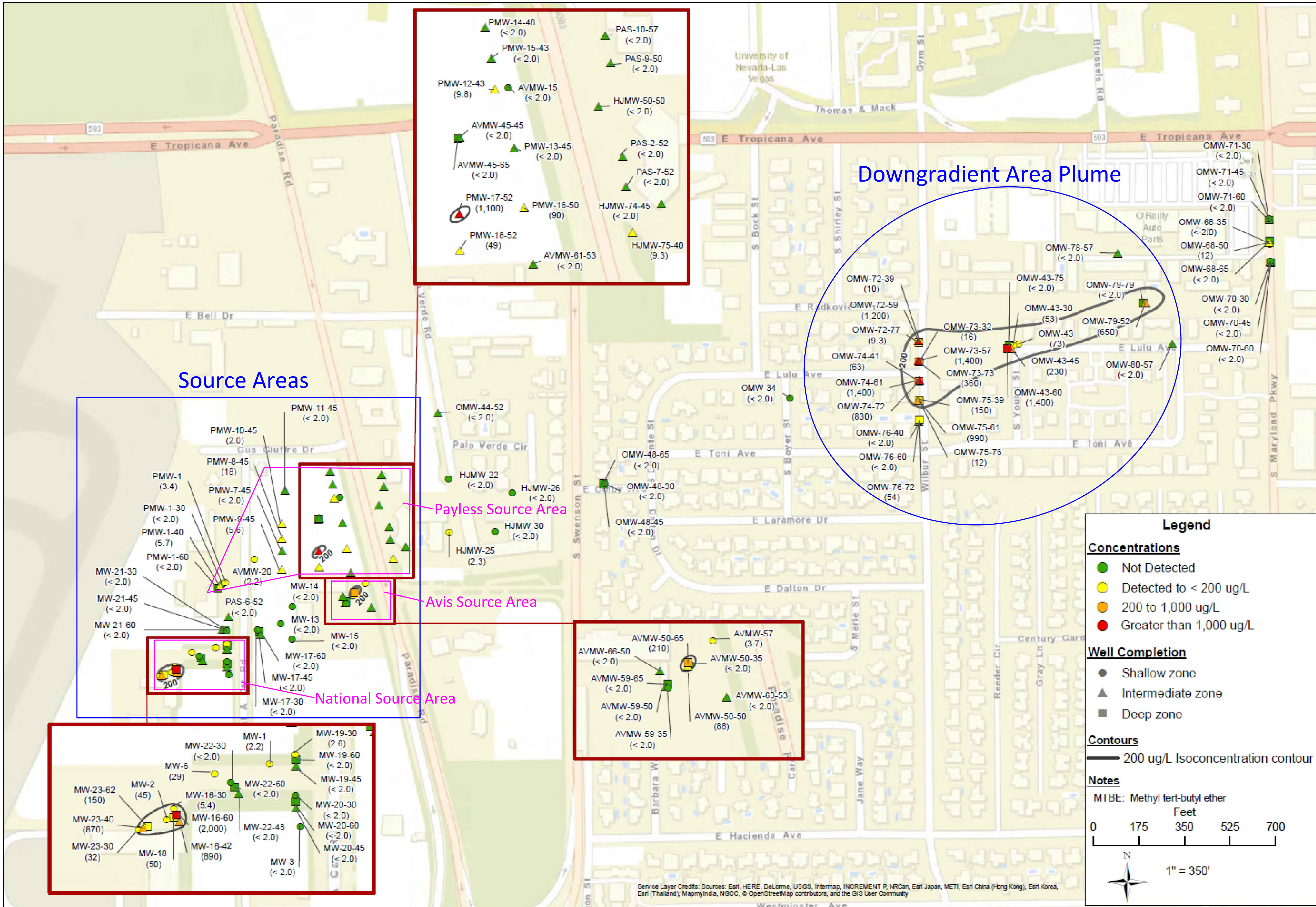

FIGURE 1

Site Map with Fourth Quarter 2017 MTBE Results

Former Car Rental Facilities
McCarran International Airport
Las Vegas, Nevada

OGI ENVIRONMENTAL, LLC

CONVERSE CONSULTANTS

BROADBENT & ASSOCIATES, INC.

CE2 Corporation
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Pleasanton, CA 94588-3677
PH. (925) 463-7301 FAX. (925) 463-7351

Z:\PROJECTS\McCarran\GIS\Events\20171219_2017Q4\mxd CE2 Corp 1/23/18

Figure 2 Proposed Remediation Well Locations

LEGEND

- Existing Monitoring Well Location
- Proposed Remediation Well Location
- Property Line
- Estimated MTBE Plume (>200 µg/L) at 45' to 70' Below Ground Surface (approximately 15' thick at trailing edge, 10' thick at leading edge)

0 75 150

SCALE: 1 inch = 75 feet

N

BROADBENT

Prepared by: JEH Reviewed by: JEH Date: 3/13/18

Proposed Remediation Well Locations
Former McCarran International Airport
Car Rental Facilities
Las Vegas, Nevada

Project No. 95-01-150 NDEP 00281

Figure

2

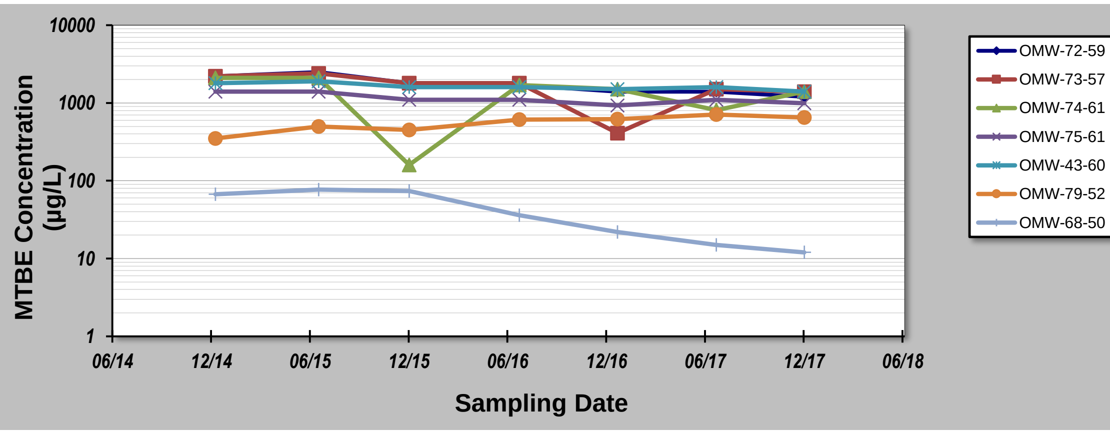
APPENDICIES

Appendix A: Mann Kendall Worksheet

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	1-Mar-18	Job ID:	95-01-150
Facility Name:	McCarran Car Rental Facilities	Constituent:	MTBE
Conducted By:	Broadbent & Associates, Inc.	Concentration Units:	µg/L

Sampling Event	Sampling Date	OMW-72-59	OMW-73-57	OMW-74-61	OMW-75-61	OMW-43-60	OMW-79-52	OMW-68-50
		MTBE CONCENTRATION (µg/L)						
1	12/17/14	2200	2200	2100	1400	1800	350	67
2	6/25/15	2500	2400	2100	1400	1900	500	77
3	12/9/15	1800	1800	160	1100	1600	450	74
4	6/29/16	1700	1800	1700	1100	1600	610	36
5	12/27/16	1400	410	1500	930	1500	620	22
6	6/27/17	1400	1500	810	1100	1600	710	15
7	12/6/17	1200	1400	1400	990	1400	650	12
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.27	0.40	0.50	0.16	0.10	0.23	0.66
Mann-Kendall Statistic (S):		-18	-14	-10	-13	-14	17	-17
Confidence Factor:		99.7%	97.5%	90.7%	96.5%	97.5%	99.5%	99.5%
Concentration Trend:		Decreasing	Decreasing	Prob. Decreasing	Decreasing	Decreasing	Increasing	Decreasing



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

Appendix B: Environmental Microbiology Laboratory Report

Environmental Microbiology Laboratory Report

Department of Chemistry & Biochemistry, CSU Chico
CSU Chico Research Foundation
25 Main Street, Suite 103Chico, CA 95929 USA

Broadbent & Associates, Ltd
8 West Pacific Avenue
Henderson, NV 89015
Project Name: **Avis**
Project Manager: **Kyle Virva, CEM**
Project Geologist

Reporting Date: **May 18, 2018**
CSU Chico Log-in: **SP-18-361, RF 18-09**
Project Number**: 95-01-150**
Sampling Date: **May 2, 2018**
kvirva@broadbent.com

Environmental Microbiology Small Sample Analysis Bacteria Enumeration and Nutrient assay Report for 3 GW samples collected at Avis site, Las Vegas May 2, 2018

Samples: 3 groundwater samples were received on 5/3/18 and assayed the next day at our Environmental Microbiology lab. Please see the attached signed Chain of Custody form.

AEROBIC Hydrocarbon-Degrading and Total Heterotrophic Bacteria Enumeration Assays

Analysis Request: Enumeration by agar plate counts of aerobic total heterotrophic (HPC) bacteria and aerobic petroleum hydrocarbon-degrading bacteria (fed a blend of gasoline/diesel as their sole source of carbon and energy) by Standard Methods for Water & Wastewater method 9215A (HPC) and method 9215B (modified for HC degraders).
Carbon Source for Aerobic Hydrocarbon-Degrading Bacteria: Pasteurized regular gasoline and diesel no. 2 (1:1) were dissolved into agar plates as the sole carbon and energy source for the growth of aerobic hydrocarbon-degrading bacteria.
Protocol for Hydrocarbon-Degrading Bacteria: Sterile agar plates (100 x 15 mm) were prepared with minimal salts medium at pH 6.8 with agar and hydrocarbons, without any other carbon sources or nutrients added. Sets of triplicate plates were inoculated with 1.0 ml of each sample (the initial log dilution 10^{0}) followed by consecutive log dilutions of the GW sample at 10^{-0}, 10^{-1}, 10^{-2} and 10^{-3}. The hydrocarbon plates were counted after 10 days of incubation at 30ºC. The agar plate count data are reported as colony forming units (cfu) per milliliter (ml) of water.
Carbon Source for Aerobic Total Heterotrophic Bacteria: Growth medium was prepared with Standard Methods Heterotrophic Plate Count agar (HPC agar, Difco) containing a wide range of carbon sources derived from yeast extract, tryptone, pancreatic digest of casein and glucose.

Protocol for Total Heterotrophic Bacteria: Sterile agar plates (100 x 15 mm) were prepared with minimal salts medium and 2.35% Difco heterotrophic plate count agar at pH 6.8 without any other carbon sources or nutrients added. Triplicate plates were inoculated with 1.0 ml of each sample (the initial log dilution 10^0) followed by log dilutions of the GW sample at 10^{-1}, 10^{-2}, 10^{-3} and 10^{-4}. The heterotrophic plates were counted after 8 days of incubation at 30ºC. The plate count data are reported as colony forming units (cfu) per milliliter (ml). Each enumeration value represents a statistical average of the plate count data obtained from two of the four inoculating log dilutions assayed. These HPC (heterotrophic plate count) bacteria represent a broad range of aerobic strains that degrade a variety of organic materials; the hydrocarbon-degraders are a subset of the total heterotrophic bacteria.

AEROBIC
Hydrocarbon-Degrading and Total Heterotrophic Bacteria in GW

Client Sample Number	Sample Date	Hydrocarbon Degraders (cfu/ml)	Target Hydrocarbons Tested	Total Heterotrophs (cfu/ml)
OMW-43-60	5/2/18	4.5×10^2	Gasoline/Diesel	8×10^2
OMW-73-57	5/2/18	2.5×10^3	Gasoline/Diesel	4×10^3
OMW-79-52	5/2/18	5×10^2	Gasoline/Diesel	3×10^2
Sterile Water	5/3/18	0	Gasoline/Diesel	0
Air control	5/3/18	0	Gasoline/Diesel	0
Positive Control	5/3/18	8×10^5	Gasoline/Diesel	6×10^6

Reporting Limit for enumeration data is 1×10^1 cfu/ml. The Aerobic HCD assay was run twice to confirm results.

A positive control sample was run concurrently with these samples using a mixed flask culture of aerobic HC-degrading bacteria derived from native strains in groundwater collected from other petroleum-contaminated sites in CA.

pH and Nutrient Assays

pH was measured with a Hanna bench top digital pH meter calibrated at pH 4, 7 and 10, using replicate measurements averaged to yield the pH values reported in the table below. T = 23 Deg. C.

Field Sample ID	CSUC Lab ID	pH
OMW-43-60	BB1	6.97
OMW-73-57	BB2	7.06
OMW-79-52	BB3	6.9

Protocol for Nutrient Assays: Three well established colorimetric Standard Water and Wastewater Methods are used to measure the concentrations of macronutrients (N, P and S) in the GW samples after removing suspended clay particles and debris that would cause interference. Each assay relies on pre-measured Hach reagents to generate the reaction color change to read by absorbance (specific wavelength for each nutrient test reaction) based on the SMWW colorimetric methods for ammonia nitrogen (SM 4500 NH3-D), nitrate nitrogen (SM 4500 NO3-D), and ortho-phosphate (SM 4500P-E).

On the day the samples were received, each GW sample was prepped by low speed centrifugation (2500 rpm for 5 min), followed by freezing the decanted supernatants (45 ml each) at -20 Deg C. On the day the nutrient assays were run, the frozen samples were thawed to ambient temperature and centrifuged in an ultracentrifuge (10,000 rpm) to further clarify interfering particulates that would potentially distort the spectrophotometric assay readings. The formation of solid ice tends to force particulate and colloidal suspensions to precipitate leaving a clear, transparent supernatant after centrifugation.

Each nutrient has a specific set of reagents and unique absorbance wavelength to read the 'color' intensity of each reaction within a very narrow range of concentrations that require higher levels of nutrient in GW to be diluted accordingly. A standard curve is generated for each nutrient assay immediately before running the assay on GW samples; the standard curve is then used to determine the concentrations of nutrient from their respective absorbance data. Dilutions of the original GW sample are made according to initial test results so that the final sample dilution (to a total of 10 ml) falls clearly within the linear range of each standard curve.

Please refer to the attached spreadsheets for the GW absorbance data relative to standard curves for ammonia, o-phosphate and nitrate. The nutrient assay table below summarizes spreadsheet data.

Nutrient Assays
Data for Monitoring Well Samples

Lab #	Field Sample Identification	Ammonia Nitrogen (mg/l)	Ortho-Phosphate (mg/l)	Nitrate N (mg/l)
1	OMW-43-60	0.39	0.41	0.78
2	OMW-73-57	0.98	0.38	<0.2
3	OMW-79-52	0.68	0.55	1.91

Discussion

Bacteria densities appear consistent with other hydrocarbon-contaminated groundwater sites and suggest active microbial bacterial degradation is occurring in this aquifer.

The population of overall aerobic heterotrophic bacteria were high in MW OMW-73-57 at 4,000 colony forming units (cfu) per milliliter (ml). Most of these bacteria were likely to be consuming petroleum contaminants as the subpopulation of aerobic hydrocarbon-degrading bacteria population densities were similar at 2,500 cfu/ml. The other two remaining wells reported lower, but nonetheless, significant populations of aerobic hydrocarbon-degrading bacteria, which were similar in value to the total heterotrophic bacterial plate counts. These data suggest no other carbon source, such as organic material from leaking sewer lines, would account for the high bacteria densities.

These organisms are typically facultative bacteria capable of surviving by anaerobic respiration when dissolved oxygen levels are depleted in the aquifer, as the case appears to be here. Hence, introduction of modest levels of dissolved oxygen through aeration of the aquifer or the introduction of dilute concentrations of hydrogen peroxide would accelerate the oxygen-limited biodegradation of dissolved-phase petroleum contaminants.

pH values of the 3 groundwater samples were close to neutral, suggesting low metabolic activity in the aquifer. As petroleum hydrocarbons are degraded, the intermediate products are short chain fatty acids that tend to drive the pH down.

Nutrient levels in the 3 groundwater samples were low, all below 1 mg/l with the exception of MW OMW 79-52 which had nearly 2 mg/l nitrate N. These data would suggest the aquifer is low to depleted in nutrient levels required to sustain active biodegradation of petroleum hydrocarbons if they are present at levels greater than 1-2 ppm dissolved phase TPH.

In conclusion, based on initial measurements of only 3 groundwater samples collected at the Avis site in Las Vegas, there appears to be sufficient bacteria population density to biodegrade the dissolved phase petroleum hydrocarbons present in the water or in equilibrium with contaminants adsorbed to soil particles. The introduction of dilute nutrient solutions in combination with dissolved phase oxygen by aeration or chemical injections of dilute hydrogen peroxide would likely accelerate the rate of aerobic biodegradation in the impacted zones of the aquifer. The concept of enhanced biodegradation could be tested in bench scale microcosm studies in our laboratory.

Please email me if you have any questions. I look forward to a discussion regarding the implications of these lab data for monitoring natural attenuation or potential field remediation strategies in the future.

Thank you.

Randall von Wedel, Ph.D.
Principal Biochemist

CSU Chico RF Small Sample Analysis\Lab Reports\Broadbent RF 18-09

Project:	18-09

Measurement date 5/4/2018

Field Sample ID	CSUC Lab ID
OMW-43-60	BB1
OMW-73-57	BB2
OMW-79-52	BB3

Field Sample	CSUC Lab ID	pH
OMW-43-60	BB1	6.97
OMW-73-57	BB2	7.06
OMW-79-52	BB3	6.90

CSU Chico Environmental Bioresource Laboratory, CWE Holt 141-C

Research Foundation / Department of Chemistry and Biochemistry Small Sample Analysis Project
RF Project: 18-09
Principal Investigator: Randall von Wedel, Ph.D., Adjunct Professor of Biochemistry
Student Researcher: Galen
Sample Date: 5/2/2018
Nutrient Assay Date: 5/8/2018
Nutrient Assay: Sulfate PO4 by modified ASTM xxx
Nutrient Assay Reagent: Hach PO4 packets No. xxx

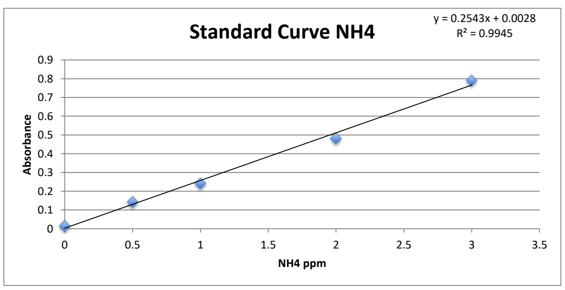
GW Samples:	
COC	**Sample ID**
OMW-43-60	BB1
OMW-73-57	BB2
OMW-79-52	BB3

Spectrophotometer wavelength (nm): 422
Spectrophotometer slit width (mm): n/a
Standard Curve ran by: Galen
Blank Abs= 0

ppm NH4	Abs 1.	Abs. 2	Abs. Avg.	Abs. Avg. - Blank
0	0.015	0.014	0.0145	0.0145
0.5	0.142	0.141	0.1415	0.1415
1	0.24	0.241	0.2405	0.2405
2	0.48	0.481	0.4805	0.4805
3	0.79	0.79	0.79	0.79

Y-int. (b):	0.00276293
Slope (m):	0.25433621
R2:	0.99445724

Errors			
m	0.25433621	0.00276293	**b**
em	0.0109627	0.01850716	**eb**
R2	0.99445724	0.02640167	**ey**



Sample ID	Original DF	DF		Abs 1	Abs 2	Abs Avg (AA)	Blank	AA- Blank	Raw Conc. (ppm)	Adjusted Conc. (ppm)	Avg .ppm mg/l	Sample ID	RvW Reported (mg/L)
BB1	1	1		0.098	0.106	0.102	0	0.102	0.3902	0.390	0.390	BB1	0.39
BB2	1	1		0.247	0.256	0.2515	0	0.2515	0.9780	0.978	0.978	BB2	0.98
BB3	1	1		0.17	0.181	0.1755	0	0.1755	0.6792	0.679	0.679	BB3	0.68

ND= Non detectable

CSU Chico Environmental Bioresource Laboratory, CWE Holt 141-C

Research Foundation / Department of Chemistry and Biochemistry Small Sample Analysis Project
RF Project: 18-09
Principal Investigator: Randall von Wedel, Ph.D., Adjunct Professor of Biochemistry

Student Researcher:	Galen
Sample Date:	5/2/2018
Nutrient Assay Date:	5/15/2018

Nutrient Assay: Sulfate PO4 by modified ASTM xxx
Nutrient Assay Reagent: Hach PO4 packets No. xxx

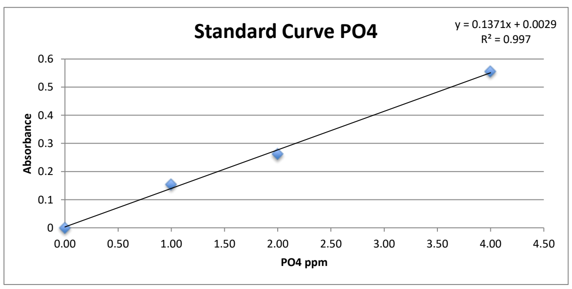
GW Samples:	
COC	Sample ID
OMW-43-60	BB1
OMW-73-57	BB2
OMW-79-52	BB3

Spectrophotometer wavelength(nm):	622
Spectrophotometer slit width (mm):	n/a
Standard Curve ran by:	Galen
	Blank Abs= 0

ppm SO4	Abs 1	Abs 2	Abs. Avg.	Abs. Avg. - Blank
0.00	0	0	0	0
1.00	0.154	0.155	0.1545	0.1545
2.00	0.261	0.261	0.261	0.261
4.00	0.555	0.556	0.5555	0.5555

Y-int. (b):	0.0029
Slope (m):	0.13705714
R2:	0.99699462

Errors			
m	0.13705714	0.0029	b
em	0.00532096	0.01219186	eb
R2	0.99699462	0.01573962	ey



Slit width= 0.009 mm

Sample ID	Original DF	DF		Abs 1	Abs 2	Abs Avg (AA)	Blank	AA- Blank	Raw Conc. (ppm)	Adjusted Conc. (ppm)	Avg .ppm mg/l	Sample ID	RvW Reported (mg/L)
BB1	1	1		0.056	0.061	0.0585	0	0.0585	0.4057	0.406	0.406	BB1	0.41
BB2	1	1		0.053	0.056	0.0545	0	0.0545	0.3765	0.376	0.376	BB2	0.38
BB3	1	1		0.074	0.082	0.078	0	0.078	0.5479	0.548	0.548	BB3	0.55

CSU Chico Environmental Bioresource Laboratory, CWE Holt 141-C

Research Foundation / Department of Chemistry and Biochemistry Small Sample Analysis Project
RF Project: 18-09
Principal Investigator: Randall von Wedel, Ph.D., Adjunct Professor of Biochemistry
Student Researcher: Galen O'Shea
Sample Date: 5/2/2018
Nutrient Assay Date: 5/9/2018
Nutrient Assay: Sulfate PO4 by modified ASTM xxx
Nutrient Assay Reagent: Hach PO4 packets No. xxx

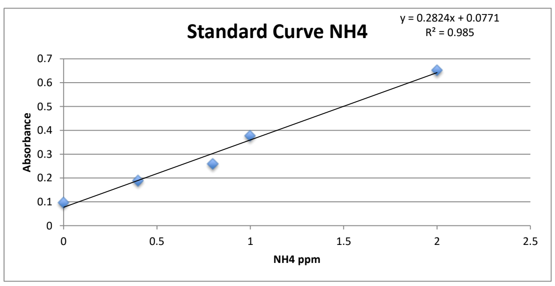
GW Samples:	
COC	**Sample ID**
OMW-43-60	BB1
OMW-73-57	BB2
OMW-79-52	BB3

Spectrophotometer wavelength (nm): 500
Spectrophotometer slit width (mm): n/a
Standard Curve ran by: Galen
Blank Abs= 0

ppm NH4	Abs 1.	Abs. 2	Abs. Avg.	Abs. Avg. - Blank
0	0.087	0.106	0.0965	0.0965
0.4	0.173	0.204	0.1885	0.1885
0.8	0.245	0.272	0.2585	0.2585
1	0.376	0.378	0.377	0.377
2	0.662	0.641	0.6515	0.6515

Y-int. (b):	0.07714437
Slope (m):	0.28244718
R2:	0.98500529

Errors			
m	0.28244718	0.07714437	**b**
em	0.02011992	0.02166982	**eb**
R2	0.98500529	0.03032707	**ey**



Sample ID	Original DF	DF		Abs 1	Abs 2	Abs Avg (AA)	Blank	AA- Blank	Raw Conc. (ppm)	Adjusted Conc. (ppm)	Avg .ppm mg/l	Sample ID	RvW Reported (mg/L)
BB1	1	2		0.186	0.19	0.188	0	0.188	0.3925	0.785	0.785	BB1	0.78
BB2	1	2		0.058	0.071	0.0645	0	0.0645	-0.0448	-0.090	-0.090	BB2	<0.2
BB3	1	4		0.211	0.213	0.212	0	0.212	0.4775	1.910	1.910	BB3	1.91

ND= Non detectable

Project: **18-09**
Plated: 5/4/2018 **Counted:** 5/10/2018

Assay: **AHET**

COC Order	Lab ID	10^0			10^1			10^2			10^3			10^4			Avg.	CFU	Reported CFU	Comments
OMW-43-60	BB1	1727	863	1020	56	46	***	1	1	2	0	0	1	x	x	x	51	510	8×10^{2}	irregular plates
OMW-73-57	BB2	TMTC	TMTC	TMTC	432	256	216	40	34	29	1	0	0	x	x	x	34	34	4×10^{3}	
OMW-79-52	BB3	288	272	288	16	19	35	0	0*	0	0	0	0	x	x	x	283	283	3×10^{2}	

Positive

10^-3			10^-4			10^-5			10^9		
Lawn	Lawn	Lawn	1	1	0	0	0	0	x	x	x

Negative

H2O		Media		Air	
0	0	0	0	0	0

10^1	10
10^2	100
10^3	1000

*=Mold **=Moltile TMTC = too many to count
*** =contaminated

Project: **18-09**
Plated: 5/4/2018 **Counted:** 5/14/2018

Assay: **AHCD**

COC Order	Lab ID	10^0			10^1			10^2			10^3			10^4			Avg.	CFU	Reported CFU	Comments
OMW-43-60	BB1	863	1099	942	41	44	49	1	1	3	0	0	0	x	x	x	45	447	4.5×10^2	
OMW-73-57	BB2	TMTC	TMTC	TMTC	272	376	264	32	25	18	0	3	1	x	x	x	25	2500	2.5×10^3	
OMW-79-52	BB3	390	628	471	20	25	17	1	0	1	1	0	0	x	x	x	496	496	5×10^2	

Positive

10^-3			10^-4			10^-5			
+	+	+	0	0	0	0	0	0	

Negative

H2O		Media		Air	
0	0	0	0	0	0

10^1	10
10^2	100
10^3	1000

*=Mold **=Moltile TMTC = too many to count

***=Contaminated

CHAIN OF CUSTODY RECORD 18-09

BROADBENT
LAS VEGAS • RENO • VACAVILLE • CHICO • SAN ANTONIO
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Project No./Name: Avis 95-01-150 Project Manager: Kyle Virva

Sampler Name: Michael Lomprey Laboratory Name:

Page of

SUL ID	Sample I.D.	Collection Date	Collection Time	No. of Containers	Matrix: Soil/Solid	Matrix: Water/Liquid	Matrix: Air/Vapor	Preservation: Unpreserved	H_2SO_4	HNO_3	HCL	Other	Total aerobic hydrocarbon-degrading bacteria	Total aerobic heterotrophic bacteria	PH	Ammonia as N	Nitrate N	Orthophosphate	Lab. No.	Comments
BB1	OMW-43-60	5-2-18	1440	1		x		1					x	x	x	x	x	x		
BB2	OMW-73-57	5-2-18	1520	1		x		1					x	x	x	x	x	x		
BB3	OMW-79-52	5-2-18	1400	1		x		1					x	x	x	x	x	x		

Bill To: Broadbent & Associates, Inc.

Relinquished by Sampler:	Date: 5-2-18	Time: 1600	Received by: FedEx	Date:	Time:
Relinquished by:	Date:	Time:	Received by:	Date: 5/3/18	Time: 10:30
Relinquished by:	Date:	Time:	Received for Laboratory by:	Date:	Time:

Temp on receipt: 1.3°C

White Copy - Laboratory. Yellow Copy - Consultant.

Turnaround Time
24 hours ☐
48 hours ☐
5 days ☐
Standard ☐
Use California Detection Limits ☐

Submit/Fax Results to:
☐ Broadbent & Associates, Inc.
8 West Pacific Avenue
Henderson, NV 89015
Phone (702) 563-0600
☐ Fax (702) 563-0610
☐ Other:

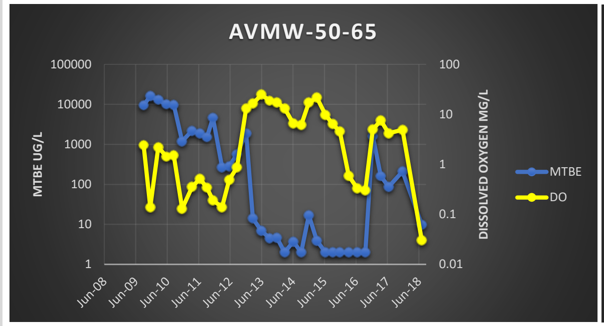
NDEP 00296

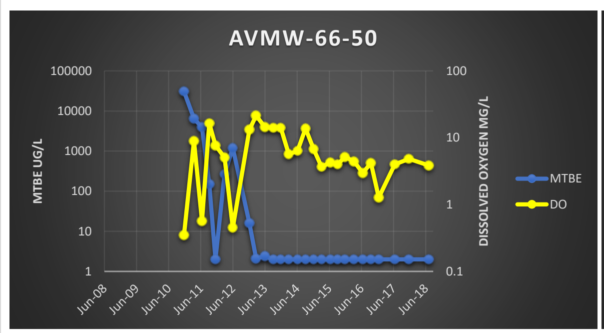
Appendix C: Historical MTBE, DO, Nitrate, Sulfate, and ORP Tables and Plots

Well ID	Date*	MTBE	DO	Nitrate	Sulfate	ORP
AVMW-50-65	9/15/09	9500	2.42	0.38	244	-7.5
	12/1/09	16000	0.14	0.19	286	-18
	3/4/10	13000	2.19	0.06	220	-152.6
	6/8/10	10000	1.43	0.5	200	-157.1
	9/1/10	9700	1.51	0.5	200	-275
	12/7/10	1200	0.13	0.5	76	-295.2
	3/31/11	2200	0.35	0.5	250	-176.2
	6/29/11	1900	0.52	0.5	270	-214
	9/20/11	1500	0.34	0.1	250	-181.5
	11/30/11	4600	0.19	0.1	280	-256.3
	3/13/12	270	0.14	0.1	270	-222.6
	6/5/12	280	0.49	0.5	280	-81.7
	9/4/12	570	0.87	0.5	300	-43.9
	12/18/12	1900	13.23	0.5	220	26.9
	3/6/13	14	16.41	2.6	310	440.5
	6/13/13	6.9	24.6	1.9	300	336.6
	9/16/13	4.5	18.85	2.3	310	296.1
	12/11/13	4.6	17.37	1.4	290	184.6
	3/10/14	2	13.24	1.8	260	121.7
	6/19/14	3.7	6.51	1.4	280	59.7
	9/17/14	2	6.12	1.6	230	40.1
	12/16/14	17	17.2	3.7	470	193.6
	3/18/15	3.9	21.68			114.9
	6/25/15	2	9.83			114.6
	9/16/15	2	6.43			96.5
	12/10/15	2	4.55			315.1
	3/22/16	2	0.59			82.8
	6/29/16	2	0.33			-206.8
	9/30/16	2	0.3			-161.7
	12/27/16	1600	4.99			98.9
	3/30/17	160	7.51			187.5
	6/28/17	87	4.2			125.6
	12/7/17	210	4.91			87.5
	7/18/18	9.8	0.03			-330.5
AVMW-66-50	12/7/10	31000	0.35			-74.8
	3/31/11	6500	8.93			227.8
	6/29/11	3900	0.57			-9.1
	9/20/11	150	16.43			-14.9
	11/30/11	2	7.69			13.3
	3/13/12	270	5.05			41.1
	6/13/12	1200	0.45			-43.7
	12/18/12	16	13.08			83.5
	3/6/13	2.1	21.46			-422.1
	6/13/13	2.4	14.39			108.4
	9/16/13	2	14.12	10	530	159.7
	12/10/13	2	14.12	3.6	480	
	3/10/14	2	5.7	3.8	510	73.5
	6/18/14	2	6.31	2.7	500	203.1
	9/17/14	2	13.78	3.7	490	324.9
	12/17/14	2	6.84	5.2	560	134
	3/18/15	2	3.67			107.6
	6/25/15	2	4.29			178.3
	9/16/15	2	3.99			95
	12/10/15	2	5.17			107.6
	3/22/16	2	4.41			123.2
	6/29/16	2	2.97			80.5
	9/30/16	2	4.18			88.9
	12/27/16	2	1.27			115.8
	6/27/17	2	3.99			155.3
	12/7/17	2	4.83			66.8
	7/18/18	2	3.86			-409.9

Source Areas

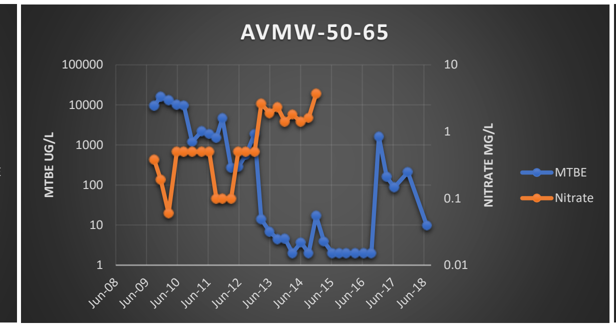
Dissolved Oxygen (DO)

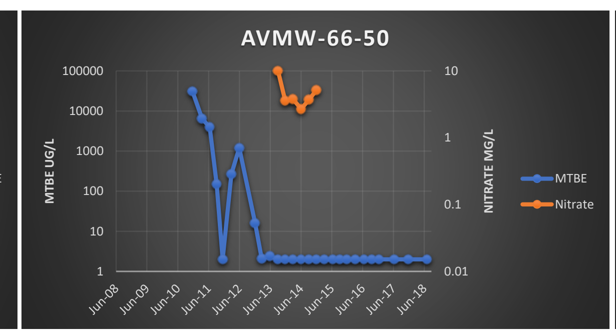




Increasing DO in 2012, followed by marked decreases in MTBE (sugesting DO was limiting)

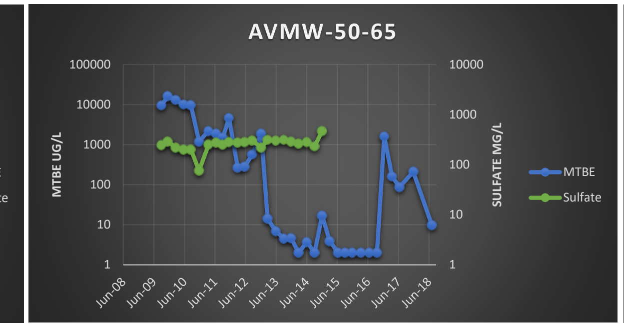
Nitrate

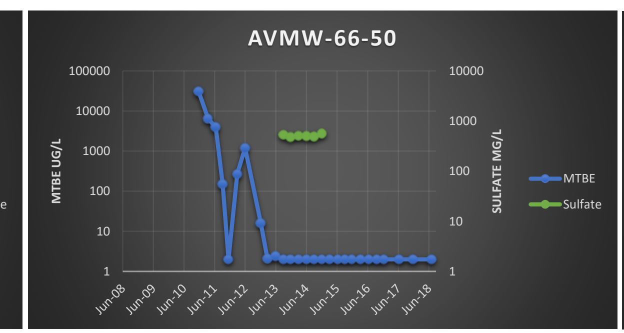




Nitrate is historically depleted, suggesting historic nitrate-reducing anaerobic conditions (i.e., low DO)

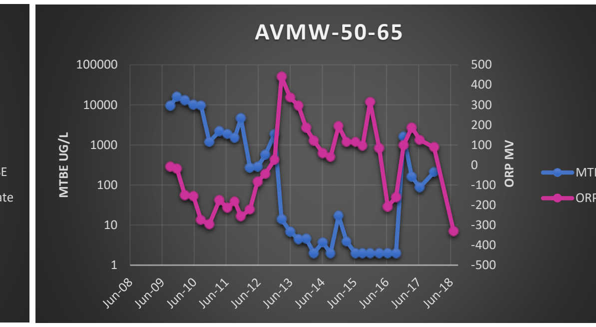
Sulfate

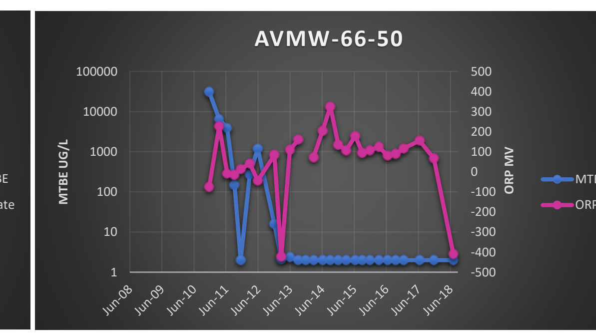




Sulfate is historically low (<500 mg/L), suggesting historic sulfate-reducing anaerobic conditions (i.e., low DO)

Oxidation Reduction Potential (ORP)



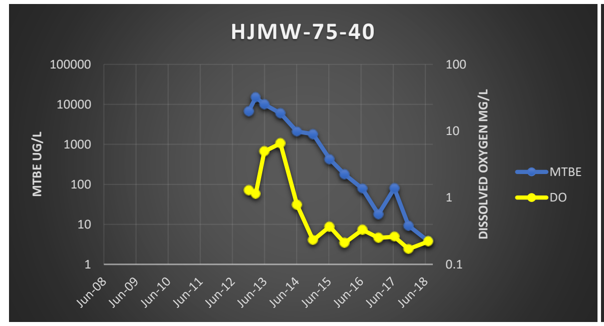


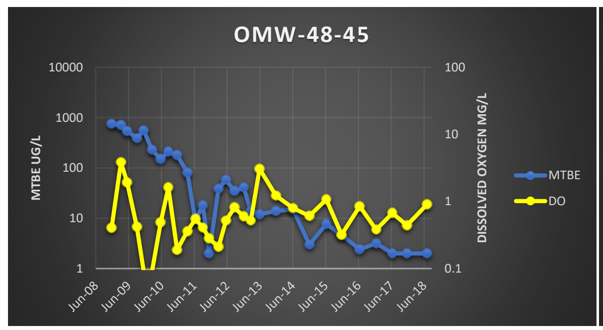
Increasing ORP in 2012, followed by marked decreases in MTBE (indicative of aerobic activity)

Well ID	Date*	MTBE	DO	Nitrate	Sulfate	ORP
HJMW-75-40	12/18/12	6800	1.29			-17.2
	3/6/13	15000	1.15			-80.6
	6/12/13	10000	4.94			50
	12/11/13	6000	6.52	0.5	280	142.9
	6/19/14	2100	0.78	0.5	260	-121.2
	12/17/14	1800	0.23	0.5	250	-108.3
	6/24/15	430	0.37			1.6
	12/10/15	180	0.21			-81.9
	6/29/16	78	0.33			-6.4
	12/28/16	18	0.25			-82.1
	6/27/17	79	0.26			-109.8
	12/6/17	9.3	0.17			-122.9
	7/18/18	3.8	0.22			-107.7
OMW-48-45	12/9/08	750	0.4	0.43	470	-57.1
	3/24/09	710	3.84	0.6	450	-123.9
	6/1/09	540	1.93	1.2	400	-194.6
	9/15/09	390	0.42	0.33	478	-228.9
	12/1/09	560	0.09	0.7	426	-187.2
	3/4/10	230	0.09	0.3	460	-221.7
	6/8/10	150	0.49	0.5	390	-169.5
	9/1/10	210	1.62	0.5	470	-258
	12/7/10	180	0.19	0.5	450	-140.7
	3/31/11	81	0.36	0.5	470	-117.3
	6/29/11	9	0.55	0.5	580	-91.2
	9/20/11	18	0.41	0.29	480	-137.8
	11/29/11	2	0.28	0.1	590	-177.4
	3/12/12	39	0.21	0.18	470	-171.8
	6/4/12	58	0.52	0.5	500	-81.6
	9/5/12	35	0.81	0.5	490	-247.6
	12/17/12	41	0.6	0.5	470	-215.4
	3/6/13	14	0.52	0.57	470	39
	6/12/13	12	3.05	0.5	480	65.9
	12/10/13	14	1.22	0.5	470	-94.6
	6/18/14	15	0.8	0.5	490	-67.1
	12/16/14	3	0.61	0.5	470	-71.2
	6/24/15	7.7	1.07			160.7
	12/10/15	4.7	0.32			-16.1
	6/28/16	2.4	0.85			-37.7
	12/28/16	3.2	0.38			-52.7
	6/27/17	2	0.67			-92.2
	12/6/17	2	0.44			59.8
	7/18/18	2	0.91			140.7

Downgradient of Source Areas

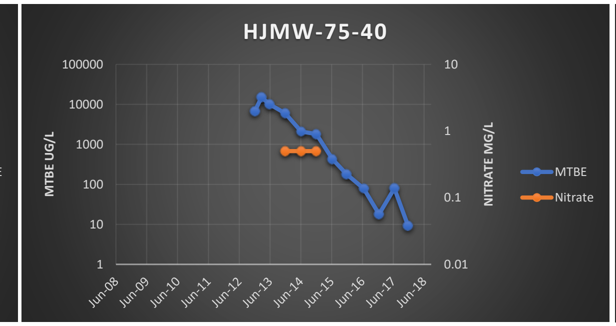
Dissolved Oxygen (DO)

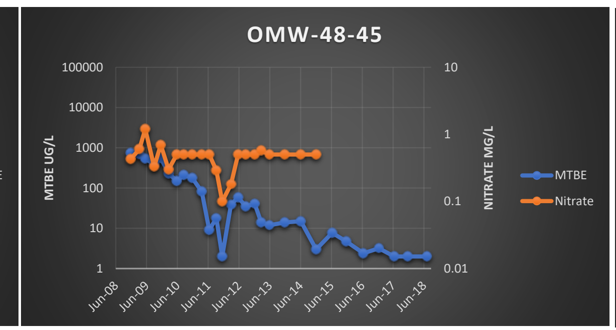




More instances of DO increasing through MTBE decreases

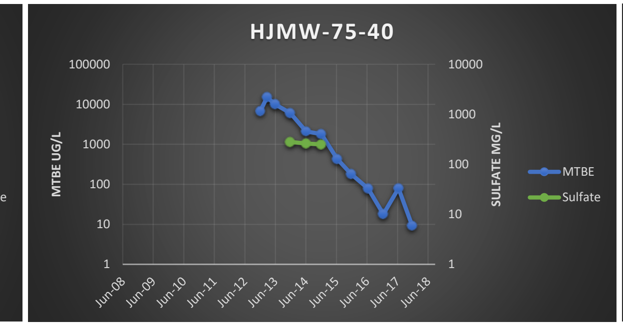
Nitrate

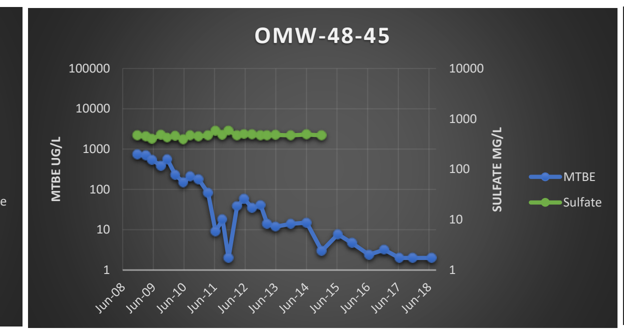




Nitrate is somewhat low (< 1.0 mg) and stable downgradient of source areas

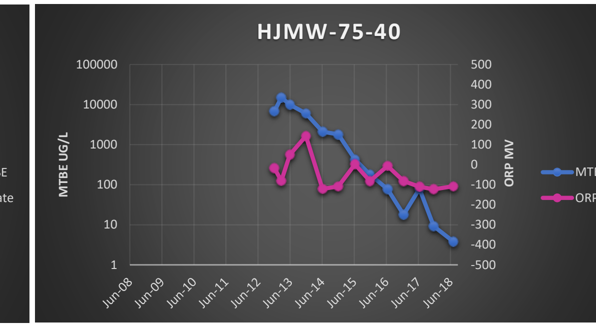
Sulfate

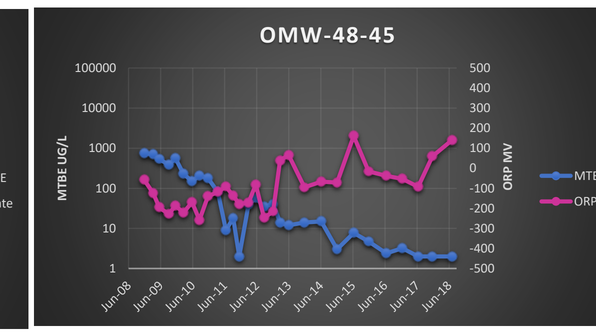




Sulfate remains relatively steady downgradient of source areas

Oxidation Reduction Potential (ORP)





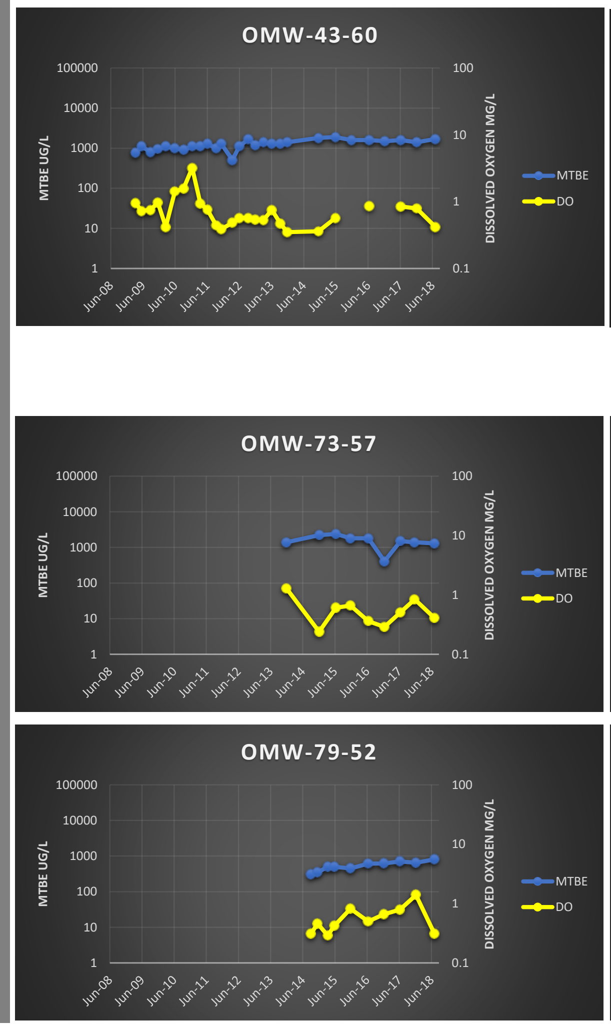
More instances of ORP increasing through MTBE decreases

Well ID	Date*	MTBE	DO	Nitrate	Sulfate	ORP
OMW-43-60	3/23/09	770	0.95	0.5	1000	
	6/1/09	1100	0.73	2.2	990	-141.7
	9/8/09	810	0.75	1.2	1200	-163.9
	12/2/09	950	0.97	1.6	1440	-88.8
	3/2/10	1100	0.42	1.3	1100	-75.1
	6/14/10	1000	1.42	1.6	1100	-33.1
	9/21/10	930	1.58	1.4	1100	-187.7
	12/27/10	1100	3.2	1.9	1000	-68.4
	3/29/11	1100	0.94	2.1	1100	-52
	6/17/11	1300	0.76	2.1	500	-134.3
	9/26/11	1000	0.44	2.4	1200	-107.3
	11/21/11	1300	0.39	2.3	1200	-11.5
	3/29/12	510	0.48	2.2	1200	-48.9
	6/13/12	1100	0.57	2.3	1100	-31.9
	9/27/12	1700	0.57	2.1	1200	-320.5
	12/11/12	1200	0.54	2	1100	-221.9
	3/13/13	1400	0.53	1.5	1200	-210.8
	6/18/13	1300	0.75	2.1	1100	124
	9/23/13	1300	0.47	1.9	1100	4.3
	12/9/13	1400	0.35	1.8	1100	-169.4
	12/1/14	1800	0.36	1.8	1200	-167.5
	6/8/15	1900	0.57			-77.8
	12/9/15	1600				23.5
	6/27/16	1600	0.86			113.4
	12/20/16	1500				78
	6/22/17	1600	0.85			70.8
	12/19/17	1400	0.79			58.9
	7/18/18	1700	0.42	0.78		129.6
OMW-73-57	12/11/13	1400	1.29	0.5	960	51.5
	12/17/14	2200	0.24	0.5	1100	-19.4
	6/25/15	2400	0.61			-143
	12/9/15	1800	0.66			-15.4
	6/29/16	1800	0.36			-67.3
	12/27/16	410	0.29			79.2
	6/27/17	1500	0.51			162.2
	12/6/17	1400	0.84			-279.6
	7/18/18	1300	0.41	0.2		-249.5
OMW-79-52	9/15/14	310	0.31	2.3	1200	96.7
	12/1/14	350	0.46	2.6	1200	117.8
	3/24/15	500	0.29			133.7
	6/8/15	500	0.42			113.5
	12/9/15	450	0.82			53.7
	6/27/16	610	0.5			97.3
	12/20/16	620	0.66			121.1
	6/22/17	710	0.79			168.8
	12/20/17	650	1.39			119.5
	7/18/18	810	0.31	1.91		-2.7

Offsite Plume

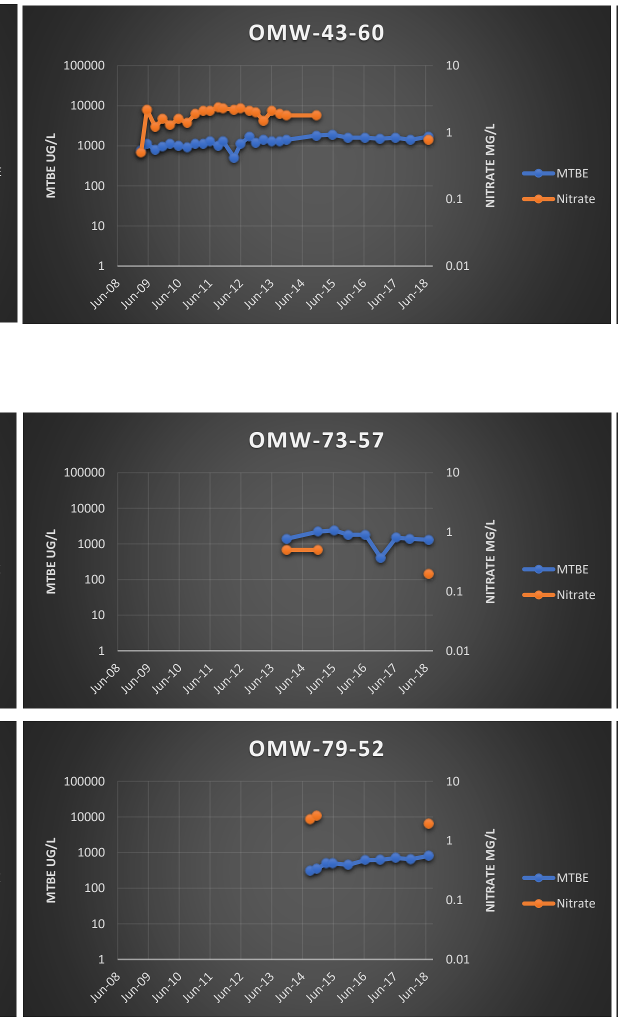
* Dates are approximate, as data sources vary (e.g., supplemental groundwater data collected by Converse from 2012-2017 was collected on different days than groundwater was sampled)

Dissolved Oxygen (DO)



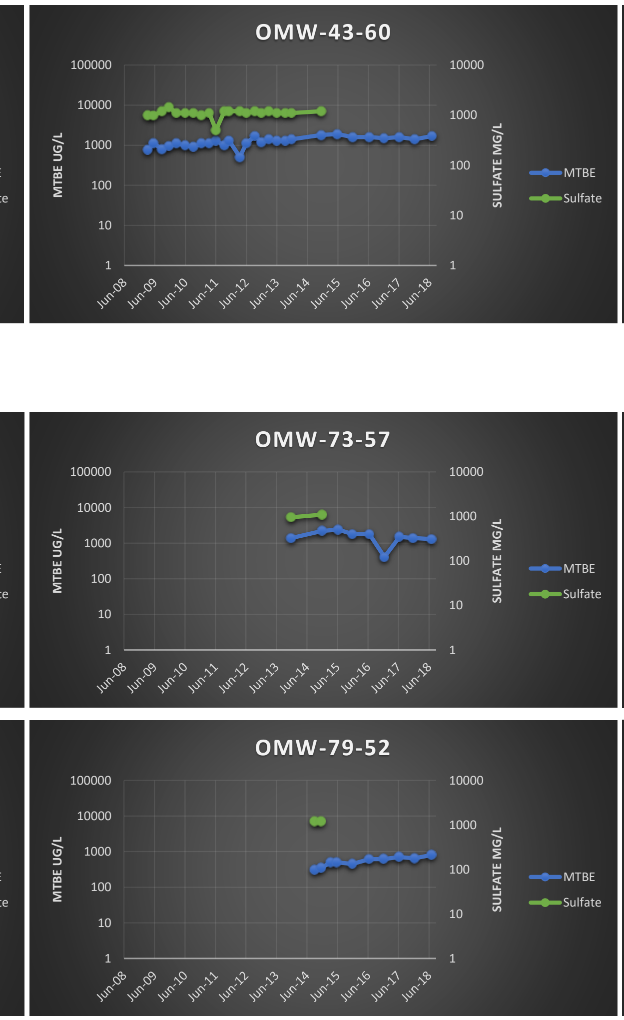
DO appears to be limiting in the Offsite Plume area (<1.0)

Nitrate



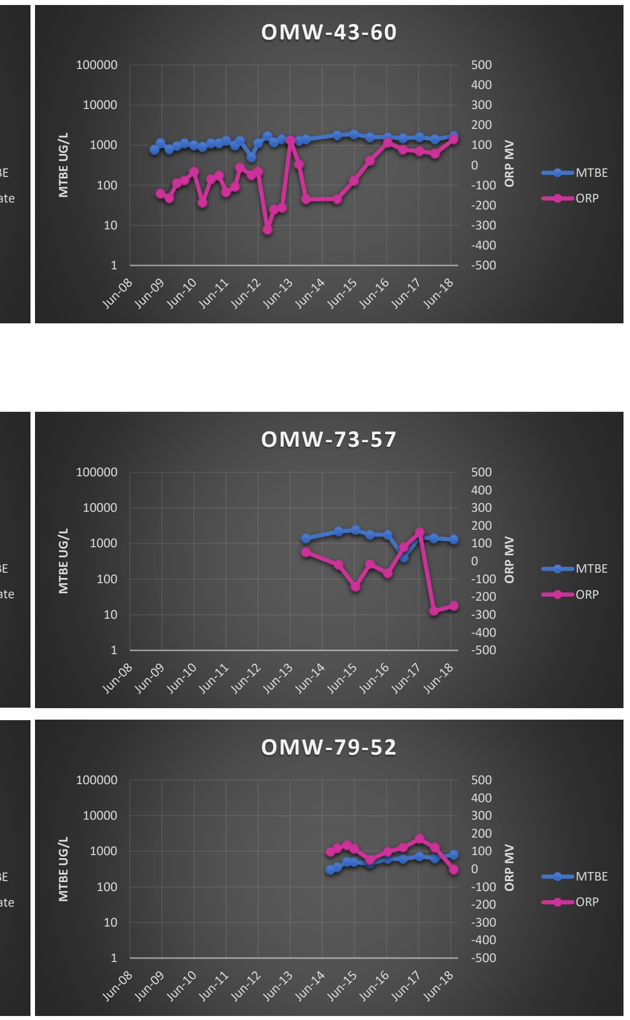
Nitrate varies from low (<1.0) to slightly elevated (>2.0) in the Offsite Plume area. Significant nitrate-reducing anaerobic activity not likely occurring, given the steady MTBE concentrations.

Sulfate



Sulfate remains relatively steady and elevated (>1,000) in the Offsite Plume area. Significant sulfate-reducing anaerobic activity not likely occurring, given the steady MTBE concentrations.

Oxidation Reduction Potential (ORP)



ORP is generally negative in the Offsite Plume, suggesting limited aerobic activity

Appendix D: Provectus® Oxygen Release Substrate ™ Technical Data Sheet

provectus ENVIRONMENTAL PRODUCTS®

TECHNICAL DATA SHEET

Provectus® Oxygen Release Substrate™
Well and Bulk Deployment of Dissolved Oxygen and Nutrients

ORS TECHNOLOGY DESCRIPTION

Provectus® Oxygen Release Substrate (ORS)™ technology is a proprietary, field-proven source of dissolved oxygen plus inorganic nutrients (e.g., phosphorous, nitrogen) and buffer to enhance the aerobic biodegradation of groundwater contaminants such as petroleum hydrocarbons (*e.g.,* BTEX, jet fuel, semivolatile organics), In the subsurface, the ORS materials will react with water to release oxygen slowly for a period of 3 to 6 months:

$$2CaO_2 + 2H_2O \text{ ---------> } 2Ca(OH)_2 + O_2$$

Our ORS is specifically designed to accelerate the aerobic biodegradation of organic compounds using naturally occurring microbes and enhance subsequent natural attenuation processes. In most cases, microbial inoculants are not required since the naturally occurring microorganisms are already present and well adapted to the site-specific conditions. Typical ORS applications include soil mixing and addition to backfill materials (ORS), placement in wells (ORS Sleeves), and subsurface injection via direct push (I-ORS). Additional information regarding the different ORS lines can be found on our website.

BENEFITS OF PROVECTUS® ORS™

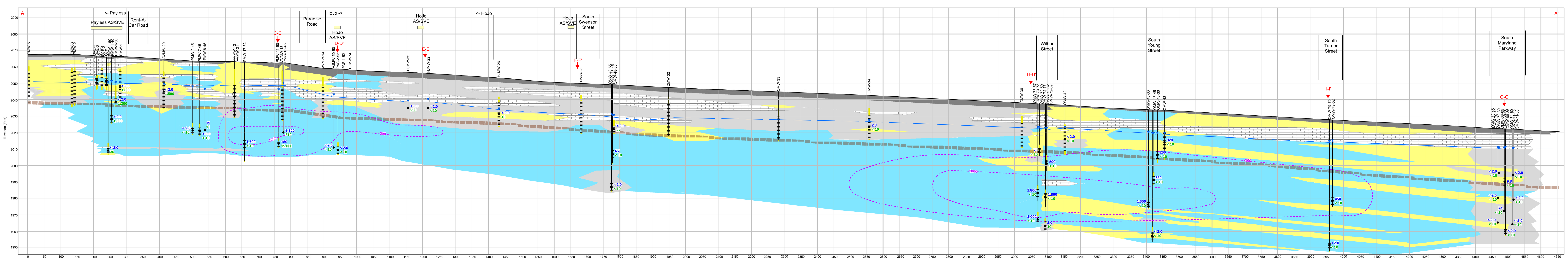
- Three different ORS options depending on site-specific conditions, remedial application and budget.
- Significant cost savings realized due to high oxygen release rate and lower price compared to alternatives.
- Contains nutrients and is pH-buffered to reduce self-encapsulation.
- Estimated longevity of 3 to 6 months.
- Substantial time savings in the field because the reusable ORS Sleeves (PVC or stainless steel) are easy to insert and retrieve from the well (see picture).
- Ease of determining the exact depth at which the ORS Sleeve is deployed.
- Sleeves available for 2" and 4" wells.
- Up to three ORS Sleeves may be suspended in a well to increase vertical zone of influence.

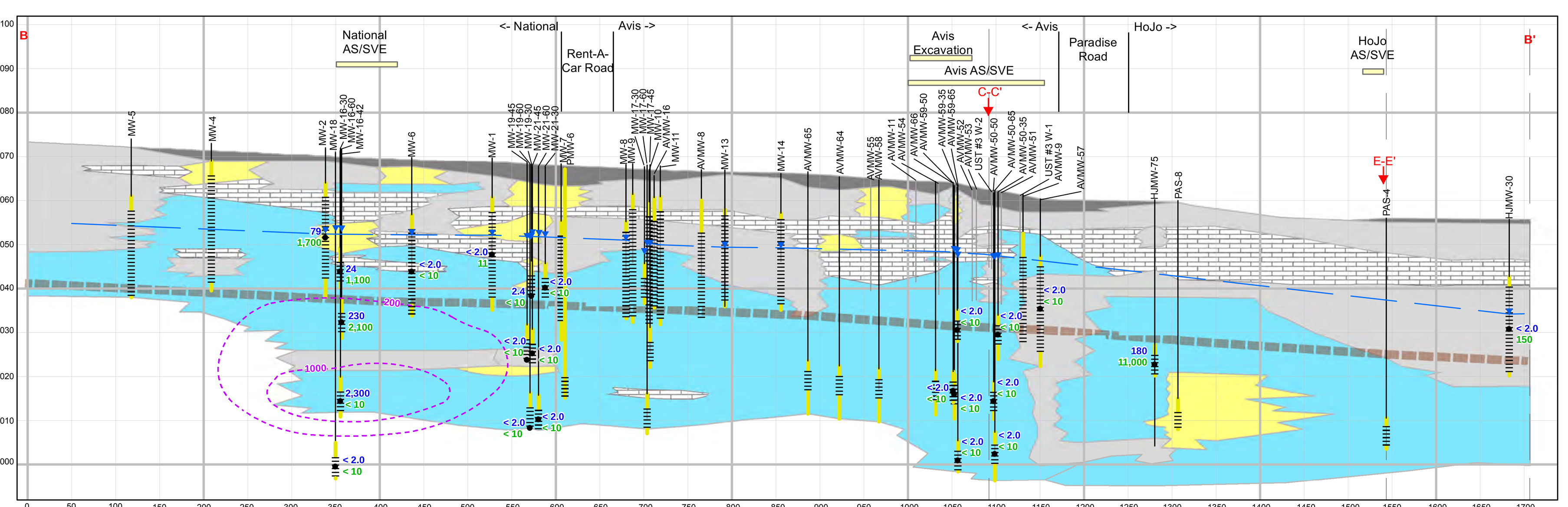
Provectus® ORS™ Sleeve

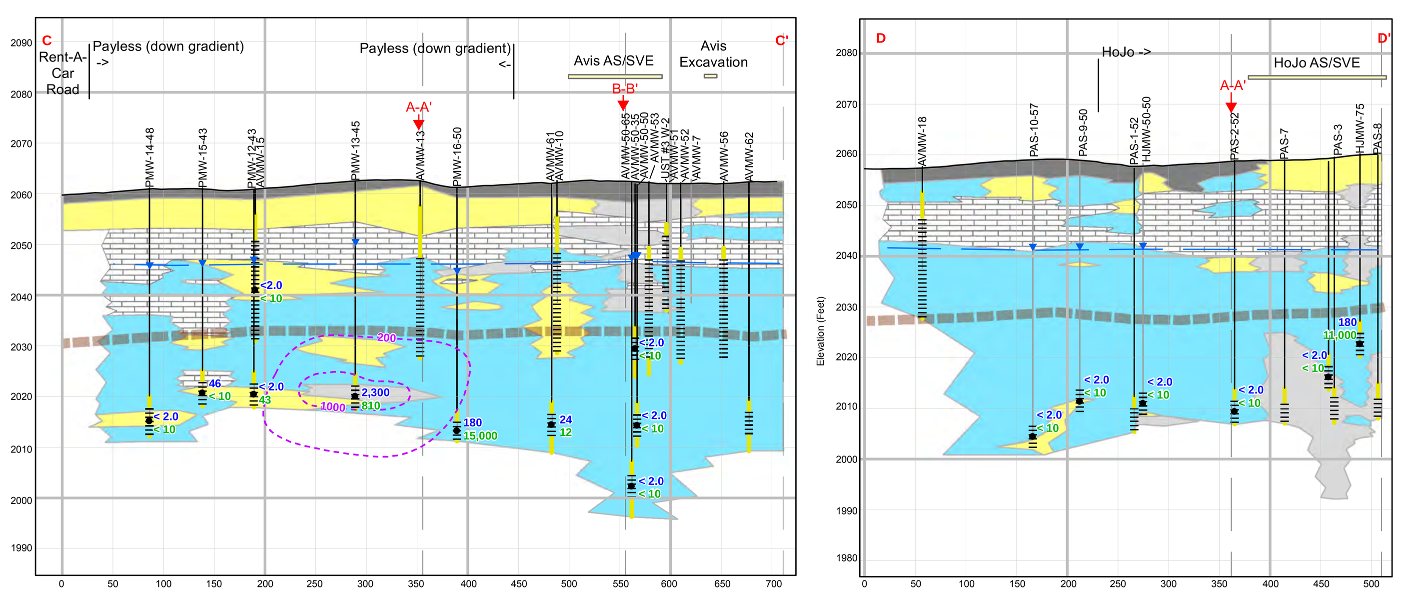
PROVECTUS® ORS FAQs

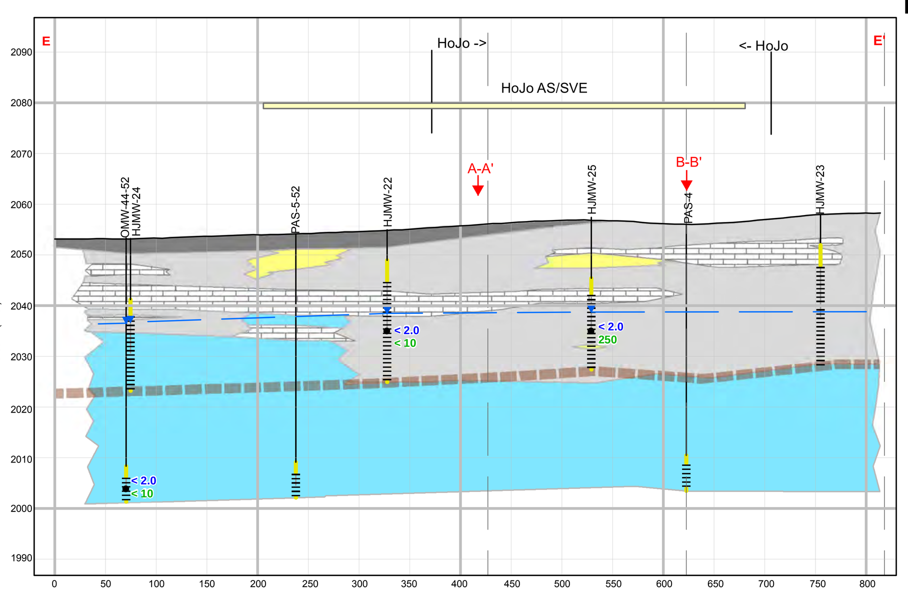
- **What are the main differences between the Provect-ORS technology and market alternatives?** Our ORS contains a well-buffered source of controlled release oxygen plus inorganic nutrients designed to accelerate the aerobic biodegradation of various organic compounds and enhance natural attenuation processes. Provectus can manufacture site-specific blends based on contaminants o concern, geochemistry and remedial goals.
- **Do I need microbial inoculants?** In most cases, the naturally occurring (indigenous) microorganisms that are already present within the aquifer are well adapted to the contaminants and site-specific conditions. Therefore, inoculants are not required.
- **What contaminants are amenable to aerobic biodegradation with ORS?** Petroleum-based aromatics (*e.g.,* BTEX, phenol) and aliphatic hydrocarbon mixtures (e.g., heating oil, diesel fuel, jet fuel, kerosene) are primary targets; MTBE, dioxane, pentachlorophenol, and other compounds are also potentially amenable to aerobic biodegradation
- **How much does ORS cost?** Provectus ORS typically costs 25% less than market alternatives.
- **How often should I replace my ORS Sleeves?** The ORS Sleeves are typically replaced every 3 to 6 months. However, various site-specific factors will influence the effective lifetime of the Sleeve.
- **Do I need to install new wells?** No. The ORS Sleeves are designed to fit standard 2-inch and 4-inch diameter groundwater wells.

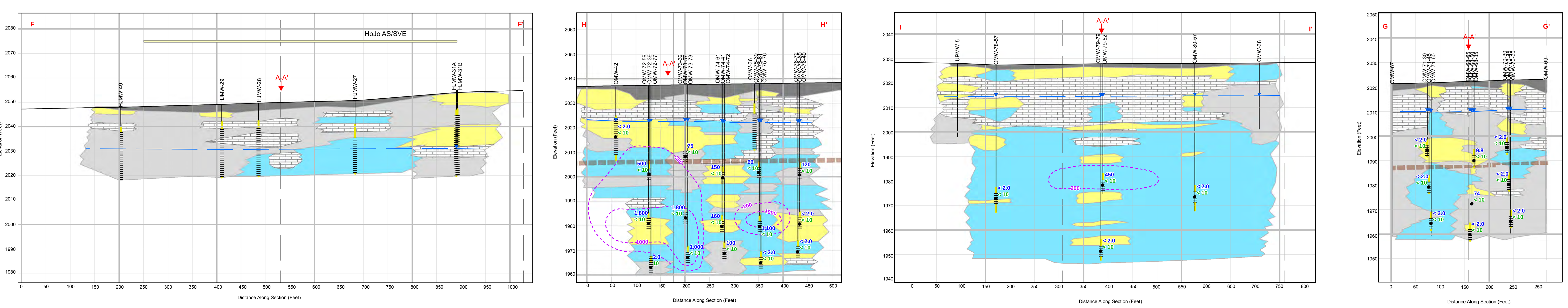
Appendix E: Interpretive Geologic Cross-Sections and MTBE & TBA Concentrations in Groundwater











Legend

- Intersection of Other Cross Section
- Well Location
- Sample from 4th Quarter 2015
- Water Levels 4th Quarter 2015 (dashed where approximate)
- Shallow Groundwater Contour 4th Quarter 2015 (Contour Interval 1 foot)
- Water Table
- MTBE contour (approximate)
- Ground surface
- Approximate Upper and Lower HSU boundary
- Artifical fill
- Caliche
- USCS symbols: CL,ML, MH
- USCS symbols: SC, SM, GC, GM
- USCS symbols: SP-SC, SP-SM, SP, SW, GP-GC,GP,GW

Surface Geology

- Qa; Alluvium of active washes
- Qoa; Older alluvium of Blue Diamond and Red Rock fans
- QTs; Consolidated sediments

Map Definitions

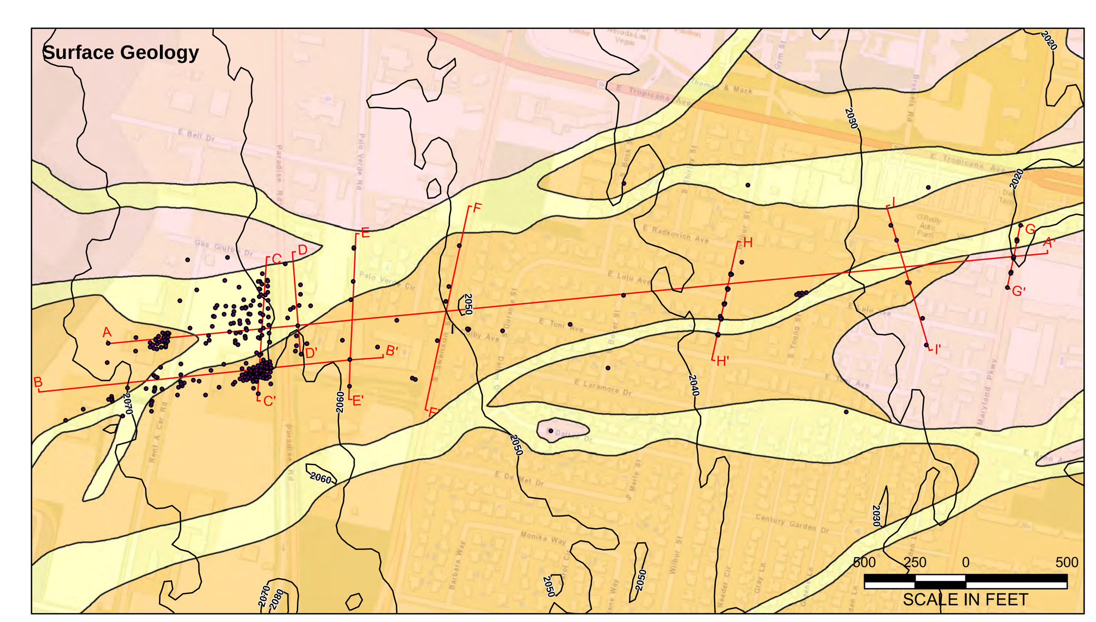
CL – Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clays
ML - Inorganic silts, very fine sands, rock flour; silty or clayey fine sands with slight plasticity
MH – Inorganic silts and organic silt-clays of high plasticity
SC – Clayey sands, sand-clay mixtures
SM – Silty sands, sand-silt mixtures
GC – Clayey gravels, gravel-sand-clay mixtures
GM – Silty gravels, gravel-silt-silt mixtures
SP – Poorly-graded sands or gravelly sands, little or no fines
SW – Well-graded sands, gravelly sands, little or no fines
GP – Poorly-graded gravels or gravel-sand mixtures, little or no fines
GW – Well-graded gravels or gravel-sand mixtures, little or no fines
MTBE – Methyl Tertiary Butyl Ether
TBA – Tertiary Butyl Alcohol
HSU – Hydrostratigraphic Unit

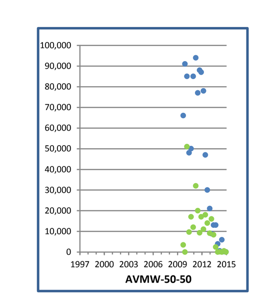
Notes:

1.These interpretive geologic cross-sections represent a generalized understanding of the subsurface, and are based on widely spaced borings. The generalized study area geology and groundwater conditions presented on this figure are conceptual. Actual conditions are expected to vary between the points of exploration.
2. Surface geology and surface contours provided by Clark County Nevada GIS clearinghouse.
3. Well log data and analytical data provided from the project collaboration site.

Well casing
Filter pack 130 MTBE (µg/L)
Screen interval 75 TBA (µg/L)

5 X Exaggeration
0 100 20
SCALE IN FEET





Trend plots show the concentration of MTBE and TBA through time for selected wells. MTBE is represented as blue dots; TBA is represented as green dots. Concentrations are in micrograms per liter (µg/L).

Interpretive Geologic Cross-Sections and MTBE & TBA Concentrations in Groundwater

Former Car Rental Facilities,
McCarran International Airport
Las Vegas, Nevada

By: BJS	Date: 9/28/2016	Project No. 731638203
LANGAN TREADWELL ROLLO		Figure 1

\\langan.com\data\SFO\other\BSAYLOR\GIS_Projects\Avis_LV\Draft_CrossSections_20151013\Final_CrossSection_20160928.mxd

NDEP 00304