

# TECHNICAL MEMORANDUM

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**To:** Nevada Environmental Response Trust

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**Cc:** Nevada Division of Environmental Protection  
United States Environmental Protection Agency

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**From:** Dan Pastor and Dana Grady

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**Date:** January 28, 2019

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**Subject:** Las Vegas Wash Bioremediation Pilot Study Monthly Progress Report

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At the direction of the Nevada Environmental Response Trust (NERT or Trust), Tetra Tech, Inc. (Tetra Tech) has prepared this memorandum which summarizes Tetra Tech's progress during December 2018 toward successfully implementing the Las Vegas Wash Bioremediation Pilot Study.

## Task Progress Update: December 2018

### Task M19 – Las Vegas Wash Pilot Study

- Task Leader – Dana Grady/Dan Pastor
- Current Status
  - Phase 1 pre-design field activities continue to be performed during this reporting period to gather relevant data and information required to optimize the final pilot study locations and design (targeted treatment interval and depth, contaminant concentrations, etc.). Based on the data collected thus far, a Treatability/Pilot Study Modification No. 2 – Las Vegas Wash Bioremediation Pilot Study (referred to herein as Modification No. 2) was submitted and approved by NDEP in August 2018. Following implementation of this modification, the Phase 1 findings and resulting Phase 2 pilot study design will be presented to NDEP, EPA and the NERT Stakeholders, followed by a third-party cost evaluation and submittal of the Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum.
  - The Phase 1 pre-design field activities described in the Las Vegas Wash Bioremediation Pilot Study Work Plan began in March 2018 and were completed in July 2018. Additional Phase 1 pre-design work as part of Modification No. 2 began on August 27, 2018 and includes installation of additional soil borings and monitoring wells, soil and groundwater sampling, slug testing, borehole dilution testing, and nuclear magnetic resonance (NMR) logging. For reference, a figure set has been provided to include an overview figure (Figure 1) and Transect 1B area Phase 1 pre-design monitoring well location figure (Figure 2). Well construction details and synoptic water levels

collected on November 12, 2018 are provided in Table 1. A summary of field activities and results is presented below:

- Upon completion of drilling and well development activities associated with Modification No. 2, a comprehensive groundwater sampling event was performed in November and December 2018 that included all 64 monitoring wells installed during both phases of drilling for Transect 1B as well as 10 existing wells (MW-02, MW-04, MW-13, MW-20, MW-25, NERT4.51S1, NERT4.71S1, NERT4.93S1, NERT5.11S1, and WMW4.9S). Perchlorate concentrations detected in groundwater at monitoring wells installed as part of the pilot study ranged from 35 to 16,000 micrograms per liter ( $\mu\text{g/L}$ ). In general, perchlorate concentrations in groundwater in the alluvium ranged from 110 to 3,900  $\mu\text{g/L}$ . Perchlorate concentrations in groundwater from monitoring wells screened within the UMCf ranged from 35 to 16,000  $\mu\text{g/L}$ . The highest detection of 16,000  $\mu\text{g/L}$  was detected in monitoring well LVWPS-MW204B, which is screened in the UMCf from 101.5 to 121.2 feet below ground surface (ft bgs). The groundwater analytical results will be discussed in more detail in the forthcoming Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum.
  - Biotraps were installed in four monitoring wells LVWPS-MW204B, LVWPS-MW212D, LVWPS-MW222C, and LVWPS-MW223A on December 26, 2018. These biotraps will be retrieved in January 2019.
  - Slug testing in 35 of the 37 new monitoring wells and two existing wells (MW-13 and WMW4.9S) began on November 26, 2018 and was completed on December 3, 2018. Slug testing was not conducted on two newly installed monitoring wells (LVWPS-MW204C and LVWPS-MW226B) due to slow recovery following well development and groundwater sampling. Data processing is ongoing, and a brief summary of the results will be provided once the processing is complete.
  - NMR logging of the deepest well at each of the 15 new well locations installed as part of Modification No. 2 began on November 12, 2018 and was completed on December 2, 2018. Data processing is ongoing, and a brief summary of the results will be provided once the processing is complete.
- Schedule and Progress Updates
    - Field work associated with the Modification No. 2 began on August 27, 2018 and is expected to continue through January 2019. All work will be performed as expeditiously as possible to minimize overall schedule impacts.
    - The UIC permit amendment was received on December 21, 2018. As a result, borehole dilution testing will be performed the week of January 7, 2019.
    - The Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum will summarize the Phase 1 findings and present the final Phase 2 design. The Work Plan Addendum will be submitted in the first quarter of 2019.
  - Health and Safety
    - There were no safety incidents related to Task M19 during December 2018.

## CERTIFICATION

### Las Vegas Wash Bioremediation Pilot Study Monthly Progress Report

#### Nevada Environmental Response Trust Site (Former Tronox LLC Site) Henderson, Nevada

#### Nevada Environmental Response Trust (NERT) Representative Certification

I certify that this document and all attachments submitted to the Division were prepared at the request of, or under the direction or supervision of NERT. Based on my own involvement and/or my inquiry of the person or persons who manage the systems(s) or those directly responsible for gathering the information or preparing the document, or the immediate supervisor of such person(s), the information submitted and provided herein is, to the best of my knowledge and belief, true, accurate, and complete in all material respects.

Office of the Nevada Environmental Response Trust

Le Petomane XXVII, not individually, but solely in its representative capacity as the Nevada Environmental Response Trust Trustee

*not individually but solely as President*  
**Signature:** Jay A. Steinberg, not individually, but solely in his representative capacity as President of the Nevada Environmental Response Trust Trustee

**Name:** Jay A. Steinberg, not individually, but solely in his representative capacity as President of the Nevada Environmental Response Trust Trustee

**Title:** Solely as President and not individually

**Company:** Le Petomane XXVII, Inc., not individually, but solely in its representative capacity as the Nevada Environmental Response Trust Trustee

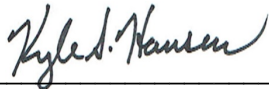
**Date:** 11/28/19

## CERTIFICATION

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I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been prepared 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, regulations, and ordinances. I hereby certify that all laboratory analytical data was generated by a laboratory certified by the NDEP for each constituent and media presented herein.

**Description of Services Provided:** Las Vegas Wash Bioremediation Pilot Study Monthly Progress Report, Nevada Environmental Response Trust Site, Henderson, Nevada.



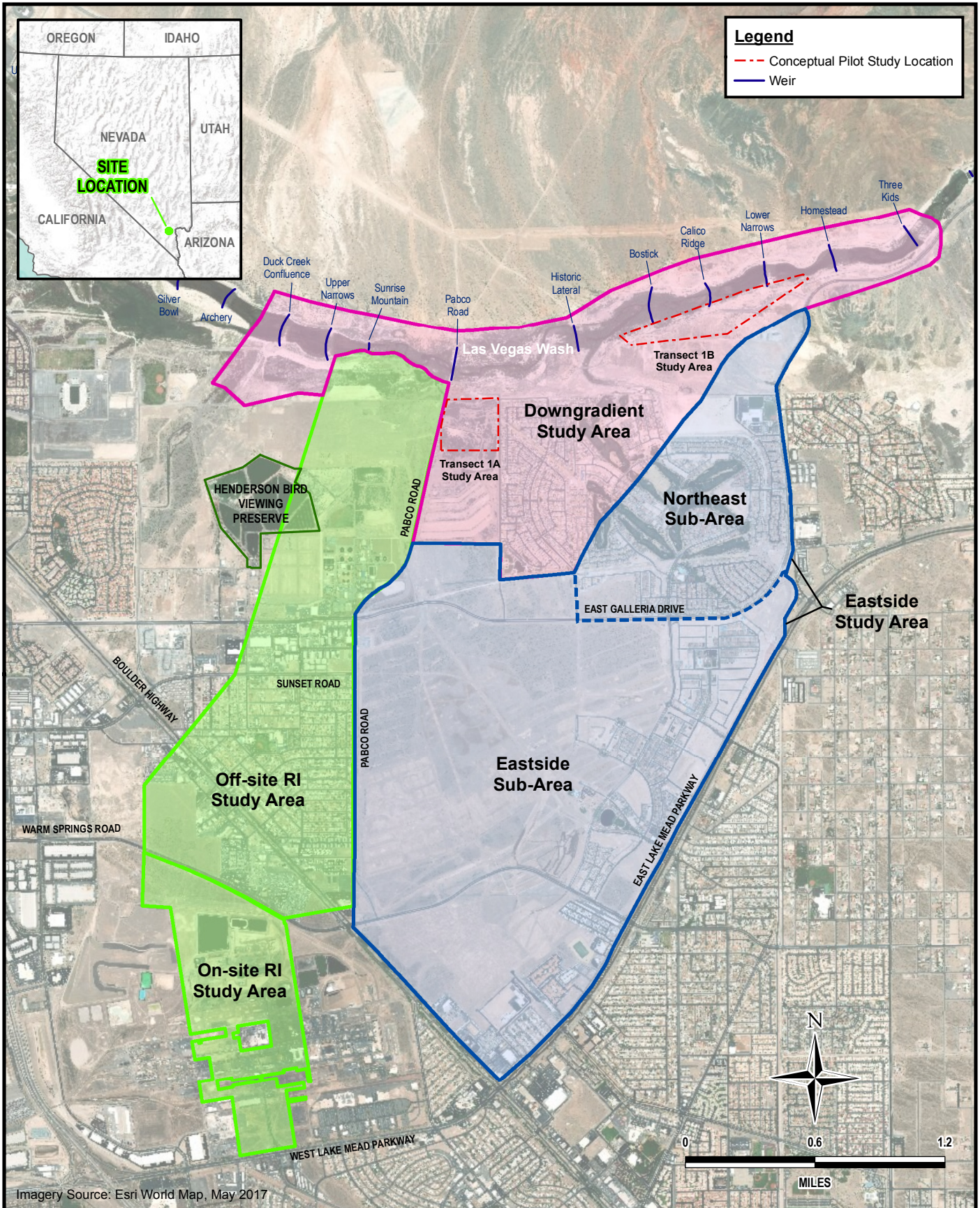
January 28, 2019

**Kyle Hansen, CEM**  
Field Operations Manager/Geologist  
Tetra Tech, Inc.

Date

Nevada CEM Certificate Number: 2167  
Nevada CEM Expiration Date: September 18, 2020

## Figures



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**TETRA TECH**

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NEVADA ENVIRONMENTAL RESPONSE TRUST

MONTHLY PROGRESS REPORT

**TREATABILITY STUDY LOCATION**

Project No.: 117-7502018

Date: JULY 09, 2018

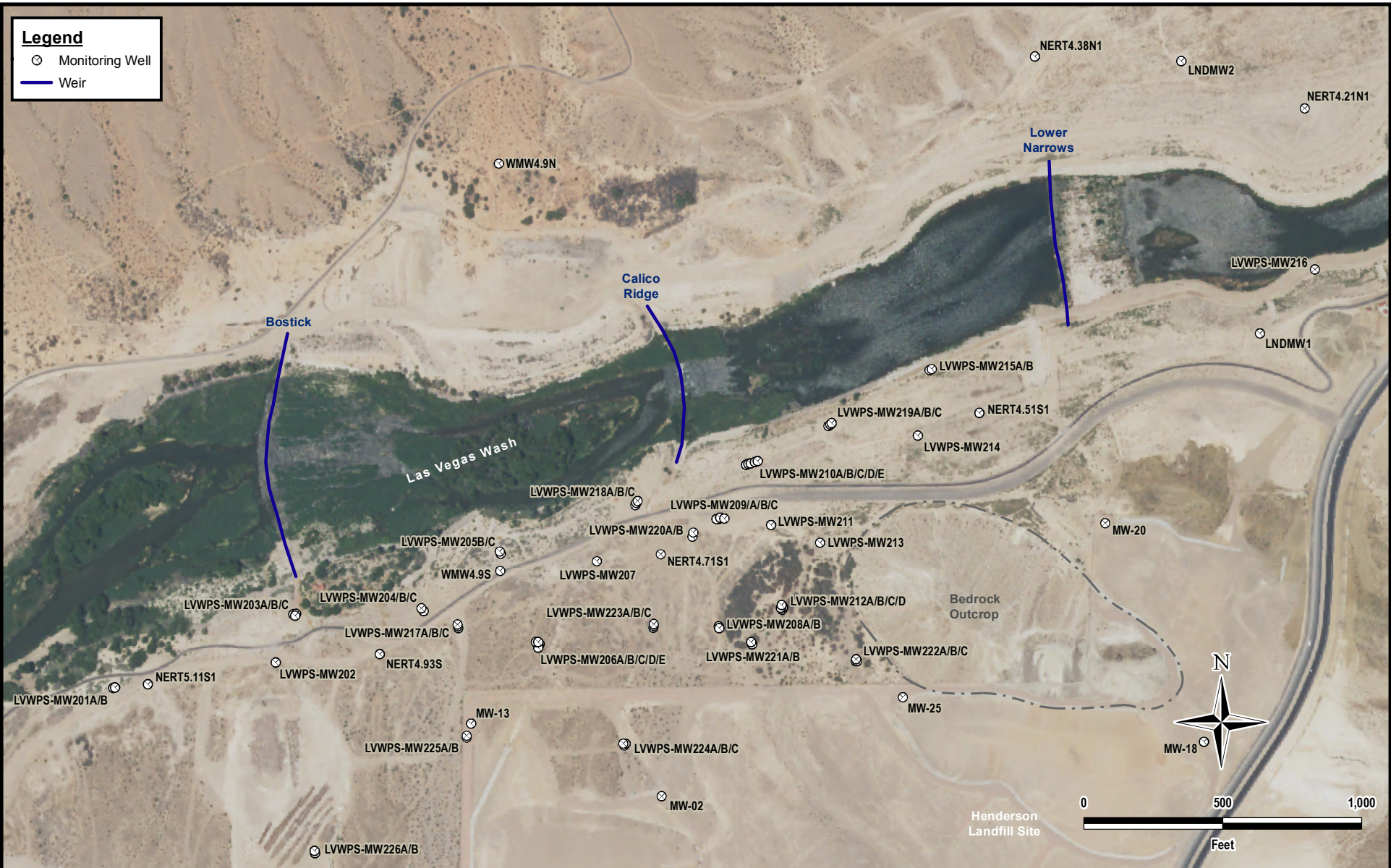
Designed By: SRA

Figure No.

**1**


**Legend**

- Monitoring Well
- Weir



\\TTS\00F5\PROJECTS\NERTGIS\FIGURE DATABASE\MXD\19\FIGURE2.MXD

Imagery Source: Esri World Map, May 2017

 <p><b>TETRA TECH</b></p> <p>www.tetrattech.com 150 S. 4th Street, Unit A Henderson, Nevada 89015 Phone: (702) 854-2293</p>	NEVADA ENVIRONMENTAL RESPONSE TRUST	PROJECT NO.: 117-7502018
	MONTHLY PROGRESS REPORT	DATE: NOVEMBER 28, 2018
	<b>PHASE 1 PRE-DESIGN LOCATIONS TRANSECT 1B VICINITY</b>	DESIGNED BY: SRA
		Figure No. <b>2</b>

## Tables



Table 1
1B Study Area Well Construction Details
Las Vegas Wash Bioremediation Pilot Study

Table with 19 columns: Monitoring Well/Borehole ID, Screened Lithology, Northing, Easting, Ground Surface Elevation, Top of Casing Elevation, Depth to Water, Groundwater Elevation, Nominal Screen Length, Slot Size, Filter Pack Gradation, Well Diameter, Borehole Diameter, Borehole Total Depth, Bottom of Filter Pack, Well Total Depth, Bottom of Screen, Top of Screen, Top of Filter Pack, Top of Bentonite Seal. The table is organized into sections for Phase 1, Pilot/Treatability Study, and Phase 2.

**Table 1**  
**1B Study Area Well Construction Details**  
 Las Vegas Wash Bioremediation Pilot Study

Monitoring Well/Borehole ID	Screened Lithology	Northing	Easting	Ground Surface Elevation	Top of Casing Elevation	Depth to Water <sup>1</sup>	Groundwater Elevation <sup>1</sup>	Nominal Screen Length	Slot Size	Filter Pack Gradation	Well Diameter	Borehole Diameter	Borehole Total Depth	Bottom of Filter Pack	Well Total Depth	Bottom of Screen	Top of Screen	Top of Filter Pack	Top of Bentonite Seal
				feet amsl	feet amsl	feet bTOC	feet amsl	feet	inches		inches	inches	feet bgs	feet bgs	feet bgs	feet bgs	feet bgs	feet bgs	feet bgs
<b>LVWPS-MW224C</b>	UMCf (Consolidated)	26734667.99	838856.30	1527.86	1527.53	34.85	1492.68	20	0.010	#2/16	4	8	195	195	194.6	194	174.5	172	168.2
<b>LVWPS-MW225A</b>	Qal	26734689.63	838291.93	1528.66	1528.50	33.51	1494.99	20	0.020	#3	2	6	76	71	69.5	69.0	49.3	47	42
<b>LVWPS-MW225B</b>	UMCf	26734696.00	838292.37	1528.33	1528.05	33.01	1495.04	20	0.010	#2/16	4	8	160	113.3	110.6	110.0	90.5	88	83.3
<b>LVWPS-MW226A</b>	Qal	26734272.67	837745.92	1535.90	1535.65	37.54	1498.11	15	0.020	#3	2	6	56	56	55.5	55.0	40.3	38.2	34
<b>LVWPS-MW226B</b>	UMCf (Consolidated)	26734280.42	837744.66	1535.79	1535.54	86.39	1449.15	20	0.010	#2/16	4	8	105	98	97.6	97.0	77.5	75	69

Notes:

amsl - above mean sea level

bTOC - below top of casing

bgs - below ground surface

Qal - Quaternary alluvium

UMCf - Upper Muddy Creek formation

Fan - Interbedded silty sand and silt with up to 10% angular gravel and cobbles (possible UMCf coarse grained facies)

1. Depth to water measurements were collected on November 13, 2018. Depth to water and calculated groundwater elevations for three monitoring wells screened in the consolidated UMCf (LVWPS-MW203C, LVWPS-MW204C, and LVWPS-MW226B) are not representative of actual potentiometric surface in the pilot study area due to ongoing slow recovery after well development.

Table 2
Groundwater Analytical Results - Transect 1B Area
Las Vegas Wash Bioremediation Pilot Study

Table with 25 columns: Location, Sample Date, QCType, Lab SampleID, E314.0, Anions by EPA 300.0 (Perchlorate, Chloride, Nitrate, Nitrite, Sulfate), E300.1, E351.2, E365.3, E218.6, Field Tests (Dissolved Oxygen, Ferrous Iron, Oxidation-Reduction Potential, pH, Conductivity, Sulfide, Temperature, Turbidity), NTOTAL, RSK175, SM2320B, Alkalinity as CaCO3.

Notes:

- C - degrees Celsius
FD - Field duplicate
J - The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+ - The result is an estimated quantity, but the result may be biased high.
mg/L - milligrams per liter
mS/cm - milliSiemens per centimeter
mV - millivolts
N - Normal field sat
NTU - Nephelometric Turbidity Unit
SU - Standard Units
ug/L - micrograms per liter
UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
< - The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.



