

TECHNICAL MEMORANDUM

To: Nevada Environmental Response Trust

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

From: Dan Pastor and Dana Grady, Tetra Tech, Inc.

Date: June 8, 2018

Subject: Las Vegas Wash Bioremediation Pilot Study Monthly Progress Report

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 April 2018 toward successfully implementing the Las Vegas Wash Bioremediation Pilot Study.

Task Progress Update: April 2018

Task M19 – Las Vegas Wash Pilot Study

- Task Leader – Dana Grady/Dan Pastor
- Current Status
 - Phase 1 pre-design field activities are being performed to gather relevant data and information required to optimize the final pilot study locations and design (targeted treatment interval and depth, contaminant concentrations, etc.). The Phase 1 findings and resulting Phase 2 pilot study design will be presented in a third quarter 2018 Stakeholder's Roundtable meeting, followed by an independent third-party review and submittal of the Las Vegas Wash Bioremediation Pilot Study Work Plan Addendum.
 - Phase 1 pre-design field activities in the Transect 1A area located on the City of Henderson (COH) parcel are on-going. The following activities were completed in April:
 - Drilling on the COH parcel began in March 2018 and was completed in April 2018. As part of this drilling effort, soil borings were advanced at 12 locations throughout the study area to a depth of approximately 120 feet below ground surface (ft bgs) to obtain area-specific lithological information. At four of the 12 locations, soil samples were collected on approximately 10-foot intervals from the top of the water table to the base of the boring and analyzed for perchlorate. At the remaining eight locations, soil samples were collected on approximately 20-foot intervals from the top of the water table to the base of the boring and analyzed for perchlorate. Select soil samples were also analyzed for total organic carbon, pH, total dissolved solids, chlorate, nitrate, sulfate, chloride, carbonate

and bicarbonate, hexavalent chromium, dissolved metals, total kjeldahl nitrogen, total phosphorus, phospholipid fatty acid, and perchlorate reductase. Once all results have been received and reviewed, draft results will be tabulated and presented in subsequent monthly progress reports.

- A total of 21 wells were installed within the Transect 1A area as prescribed in the Las Vegas Wash Bioremediation Pilot Study Work Plan. All 12 soil borings were converted to permanent monitoring wells. Additional wells were installed at five adjacent locations and screened in a different interval to evaluate the perchlorate concentration and hydraulic gradient changes with depth. At two locations, two additional wells were installed in well clusters and were screened in different intervals to evaluate the perchlorate concentration and hydraulic gradient changes with depth. Monitoring wells were screened in the saturated alluvium from approximately 20 – 45 ft bgs, upper portions of the Upper Muddy Creek formation (UMCf) from approximately 45 – 70 ft bgs, and lower portions of the UMCf from approximately 100 – 120 ft bgs. Following completion of well installation, all monitoring wells were surveyed by a land surveyor, which included both horizontal coordinates and the elevation of the ground surface and top of well casing relative to North American Vertical Datum 88. The attached Table 1 presents monitoring well construction details and the attached Figure 1 provides a map of the Phase 1 pre-design monitoring wells installed on the COH property.
 - During soil boring installation, soil was also collected and transported to the University of Nevada Las Vegas (UNLV) for use in the laboratory bench-scale study.
 - Well development began on April 23, 2018 and is on-going with a projected completion date of May 10, 2018.
- Schedule and Progress Updates
 - Task remains on schedule.
 - Upon completion of well development, groundwater sampling and aquifer testing activities for the wells installed adjacent to Transect 1A on the COH parcel will begin. Groundwater sampling is tentatively scheduled for the week of May 14, 2018, followed by aquifer testing beginning the week of May 21, 2018.
 - Pending final access approval from Clark County, Phase 1 pre-design field activities in the vicinity of the proposed Transect 1B are tentatively scheduled to begin on May 16, 2018. The first phase of field activities will include biological surveying, utility clearance, and installation of soil borings and monitoring wells.
 - Health and Safety
 - There were no safety incidents related to Task M19 during April 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 Pres. of Trust

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: 6/8/18

CERTIFICATION

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.



June 8, 2018

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

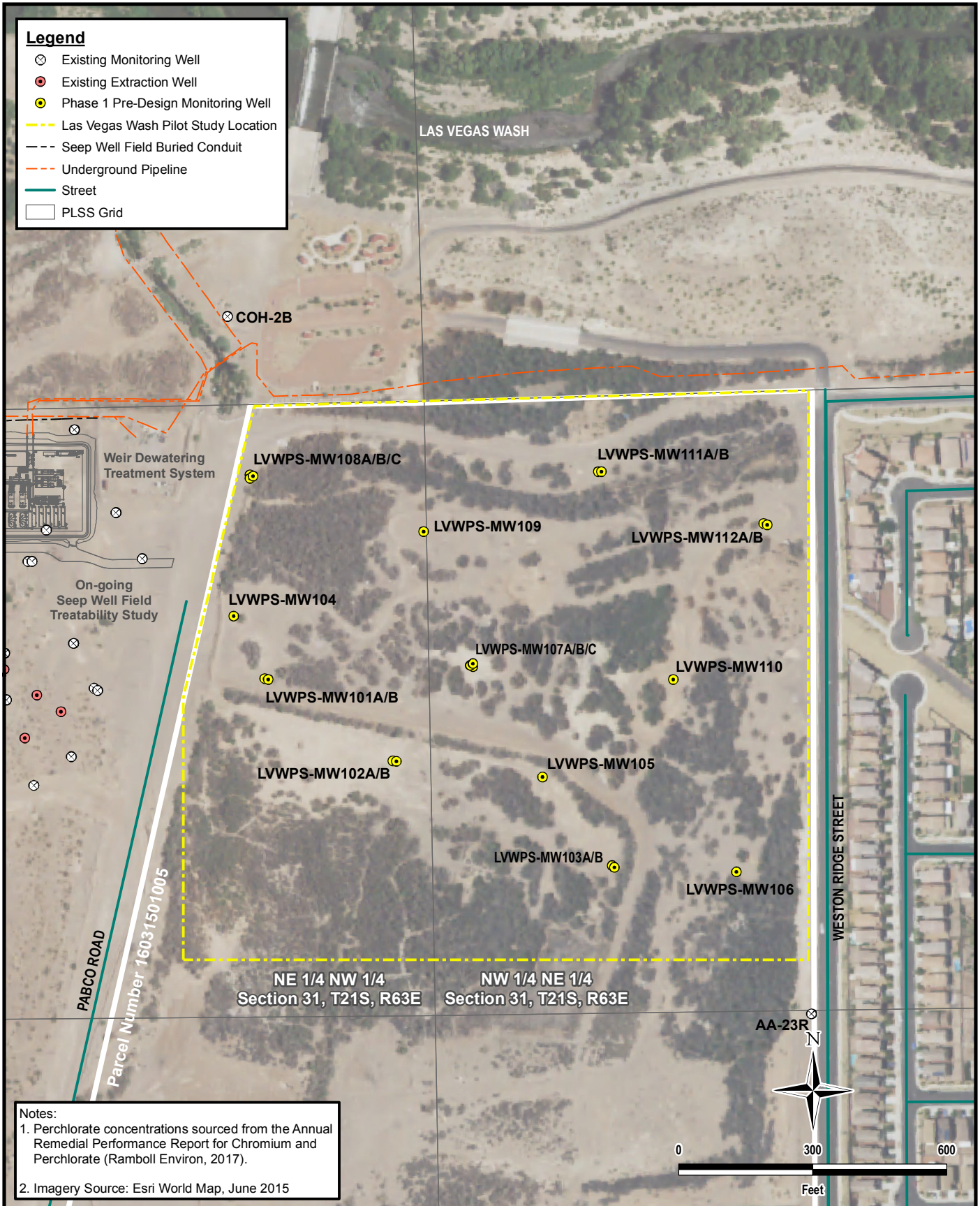
Date

Nevada CEM Certificate Number: 2167
Nevada CEM Expiration Date: September 18, 2018

Figures

Legend

- ⊗ Existing Monitoring Well
- ⊙ Existing Extraction Well
- ⊙ Phase 1 Pre-Design Monitoring Well
- Las Vegas Wash Pilot Study Location
- Seep Well Field Buried Conduit
- Underground Pipeline
- Street
- PLSS Grid



Notes:
 1. Perchlorate concentrations sourced from the Annual Remedial Performance Report for Chromium and Perchlorate (Ramboll Environ, 2017).
 2. Imagery Source: Esri World Map, June 2015

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TETRA TECH

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NEVADA ENVIRONMENTAL RESPONSE TRUST

MONTHLY PROGRESS UPDATE

**LAS VEGAS WASH PILOT STUDY PRE-DESIGN
 SOIL BORING AND MONITORING WELL LOCATIONS
 TRANSECT 1A VICINITY**

Project No.: 117-7502018

Date: JUNE 06, 2018

Designed By: SRA

Figure No.

1

Tables

DRAFT**Table 1. Las Vegas Wash Bioremediation Pilot Study Monitoring Wells
Vicinity of Transect 1a**

Monitoring Well/Borehole ID	Northing	Easting	Top of Casing Elevation	Well Diameter	Borehole Diameter	Borehole Total Depth	Well Total Depth	Bottom of Screen	Top of Screen	Screen Length	Slot Size
			feet amsl	inches	inches	feet bgs	feet bgs	feet bgs	feet bgs	feet	inches
Newly Installed Monitoring Wells (March-April 2018)											
LVWPS-MW101A	26732789.49	832678.44	1549.34	2	6	34	33.5	33	23.3	10	0.020
LVWPS-MW101B	26732788.37	832686.18	1549.13	2	6	120	65	64.5	44.8	20	0.010
LVWPS-MW102A	26732606.35	832965.93	1546.82	2	6	67	67.1	66.6	47.0	20	0.010
LVWPS-MW102B	26732605.06	832973.68	1546.78	2	6	120	97	96.5	76.8	20	0.010
LVWPS-MW103A	26732371.53	833455.96	1548.39	2	6	41	40	39.5	29.8	10	0.010
LVWPS-MW103B	26732368.31	833461.76	1548.68	2	6	120	97	96.5	76.8	20	0.010
LVWPS-MW104	26732930.15	832609.25	1547.69	2	6	120	34	33.5	23.8	10	0.020
LVWPS-MW105	26732570.24	833300.91	1547.32	2	6	120	26.7	26.2	16.5	10	0.020
LVWPS-MW106	26732357.82	833734.57	1548.62	2	6	120	50.6	50.1	30.4	20	0.010
LVWPS-MW107A	26732823.90	833144.18	1547.58	4	8	36	35	34.5	24.8	10	0.020
LVWPS-MW107B	26732816.68	833144.44	1547.82	4	8	67	66.3	65.8	46.0	20	0.010
LVWPS-MW107C	26732819.93	833138.10	1547.93	2	6	121	120.5	120	100.3	20	0.010
LVWPS-MW108A	26733238.09	832645.51	1543.56	2	6	42	41.4	40.7	20.8	20	0.020
LVWPS-MW108B	26733242.52	832652.04	1543.33	2	6	67	66.5	66	46.3	20	0.010
LVWPS-MW108C	26733245.54	832645.33	1543.62	2	6	120	119.8	119.3	99.6	20	0.010
LVWPS-MW109	26733119.00	833034.22	1544.63	2	6	120	52	51.5	36.8	15	0.020
LVWPS-MW110	26732788.02	833593.18	1545.68	2	6	120	68	67.5	47.8	20	0.010
LVWPS-MW111A	26733253.38	833424.95	1540.64	2	6	42	41	40.5	20.8	20	0.020
LVWPS-MW111B	26733253.32	833432.86	1540.22	2	6	120	78	77.5	57.8	20	0.010
LVWPS-MW112A	26733137.42	833795.12	1537.99	2	6	50	48.5	48	28.3	20	0.020
LVWPS-MW112B	26733134.16	833803.81	1538.24	2	6	120	74.5	74	54.3	20	0.010

Notes:

amsl - above mean sea level

bgs - below ground surface