

August 8, 2018

**TECHNICAL MEMORANDUM**

To: Steve Clough  
Nevada Environmental Response Trust

From: John Pekala, CEM#2347, Expires 9/20/2018, Ramboll  
Jessica Donovan, Ramboll

Re: **RI Phase 2 Modification No. 13  
Nevada Environmental Response Trust Site  
Henderson, Nevada  
Ramboll Project No. 1690006943-020**

This Technical Memorandum presents Ramboll’s recommended Modification No. 13 to the scope of work for the Remedial Investigation (RI) Phase 2 Investigation currently in progress at the Nevada Environmental Response Trust Site (the “Site”) located in Henderson, Nevada. This recommended modification proposes additional deeper investigation borings and deeper monitoring wells along the future<sup>1</sup> NERT Site downgradient (northern) property boundary to better delineate the lateral extent of a permeable zone within the Upper Muddy Creek formation (UMCf) between approximately 60-70 feet below ground surface (bgs) and the vertical extent of perchlorate and other COPCs in the subsurface.

As shown on Figure 1, eleven new groundwater monitoring wells (M-204 through M-214) were installed along the future NERT Site downgradient property boundary as part of the Phase 2 RI investigation. Subsurface conditions along the Site boundary are illustrated schematically on Figure 2. A review of the initial sampling data from these new wells indicates that the vertical extent of perchlorate impacted groundwater has not been fully delineated in the area between new wells M-204 and M-207, and at new well M-214. The approximate vertical extent of perchlorate concentrations greater than 1 mg/L is indicated by the heavy dashed red line on Figure 2, and the estimated vertical extent of perchlorate greater than 0.015 mg/L is indicated by the thin red dashed line. Also of interest is the lateral extent of a permeable zone located within UMCf at a depth of approximately 60-70 feet bgs. This zone was first identified during the installation of the Phase 2 RI soil borings near the Barrier Wall and Interceptor Well Field (IWF). The Vacuum Enhanced Recovery (VER) Treatability Study also investigated this zone with the completion of traditional aquifer testing as well as VER testing. The elevation of this zone near the IWF is between approximately 1,675-1,685 feet mean sea level (msl) datum. Given the permeability of this unit, additional investigation is warranted to determine its lateral extent and associated groundwater quality. Therefore, we are recommending additional investigation at the

---

<sup>1</sup> Refers to the NERT Site downgradient boundary following the future transfer of sale Parcel C, which is located between the future Site boundary and Warm Springs Road.

locations described below. Based on the northerly dip of the both the ground surface and subsurface units, the elevation of the permeable unit, if present, will likely be 7 to 10 feet lower at the future NERT downgradient property boundary than at the IWF.

**New well M-247.** One additional well will be installed in the UMCf adjacent to existing well M-7B and new Phase 2 RI well M-204. Planned well M-247 will be screened from approximately 65-75 feet bgs to better define the vertical extent of perchlorate and other COPCs in the interval between the base of existing well M-7B and top of existing well M-204. If it is present, the well screen will straddle the permeable zone observed near the IWF. Table 1 displays the target screened interval and well construction information. The M-247 planned well screen is illustrated on Figure 2.

**Investigation Locations RIDB-30, RIDB-31, RIDB-32, and RIDB-33.** Four deep soil borings will be advanced adjacent to recently installed RI Phase 2 wells screened in the UMCf. The proposed borings will be drilled to a planned total depth of 150 feet bgs. Soil samples will be collected at 10 foot intervals from 50 feet to total depth and analyzed for perchlorate, chlorate, total chromium, nitrate/nitrite, VOCs, and moisture content. Selected soil samples will also be tested for physical properties. Two deeper monitoring wells will be installed at each boring location to enhance the Site downgradient monitoring network. The initial target screened intervals for the additional monitoring wells are included in Table 1. However, these planned well screens may be adjusted if permeable zones in the UMCf are encountered in the associated soil borings.

Please contact us should you have any questions about the recommended additional investigation locations.

## Attachments

- |          |  |
|----------|--|
| Table 1  | Planned Additional Investigation Locations   |
| Figure 1 | Phase 2 RI Investigation – Modification No. 13   |
| Figure 2 | Schematic Subsurface Cross-Section A-A' Showing Northern NERT Site Boundary Monitoring Wells and Planned Investigation Locations |

**TABLE 1. PLANNED ADDITIONAL INVESTIGATION LOCATIONS**  
**RI Phase 2 Modification No. 13**  
**Nevada Environmental Response Trust Site; Henderson, Nevada**

Planned Monitoring Well ID	NERT Downgradient Site Boundary Location	Initial Planned Well Construction Details					
		Well Pilot Boring Depth (ft bgs)	Casing Diameter and Type	Screen Size (inches)	Screened Interval (ft bgs)	Sand Pack Interval (ft bgs)	Sand Pack Size
<b>New Well Adjacent to Wells M-7B and M-204</b>							
M-247	Adjacent to Well M-204	76	4" PVC	0.01	65-75	63-75	No. 2/12
<b>New Wells Adjacent to Planned RIDB Borings</b>							
M-248	Adjacent to <b>RIDB-30</b> (planned 150 ft bgs)	71	4" PVC	0.01	60-70	58-70	No. 2/12
M-249		91	4" PVC	0.01	80-90	78-90	No. 2/12
M-250	Adjacent to <b>RIDB-31</b> (planned 150 ft bgs)	71	4" PVC	0.01	60-70	58-70	No. 2/12
M-251		91	4" PVC	0.01	80-90	78-90	No. 2/12
M-252	Adjacent to <b>RIDB-32</b> (planned 150 ft bgs)	71	4" PVC	0.01	60-70	58-70	No. 2/12
M-253		101	4" PVC	0.01	90-100	88-100	No. 2/12
M-254	Adjacent to <b>RIDB-33</b> (planned 150 ft bgs)	71	4" PVC	0.01	60-70	58-70	No. 2/12
M-255		111	4" PVC	0.01	100-110	98-110	No. 2/12

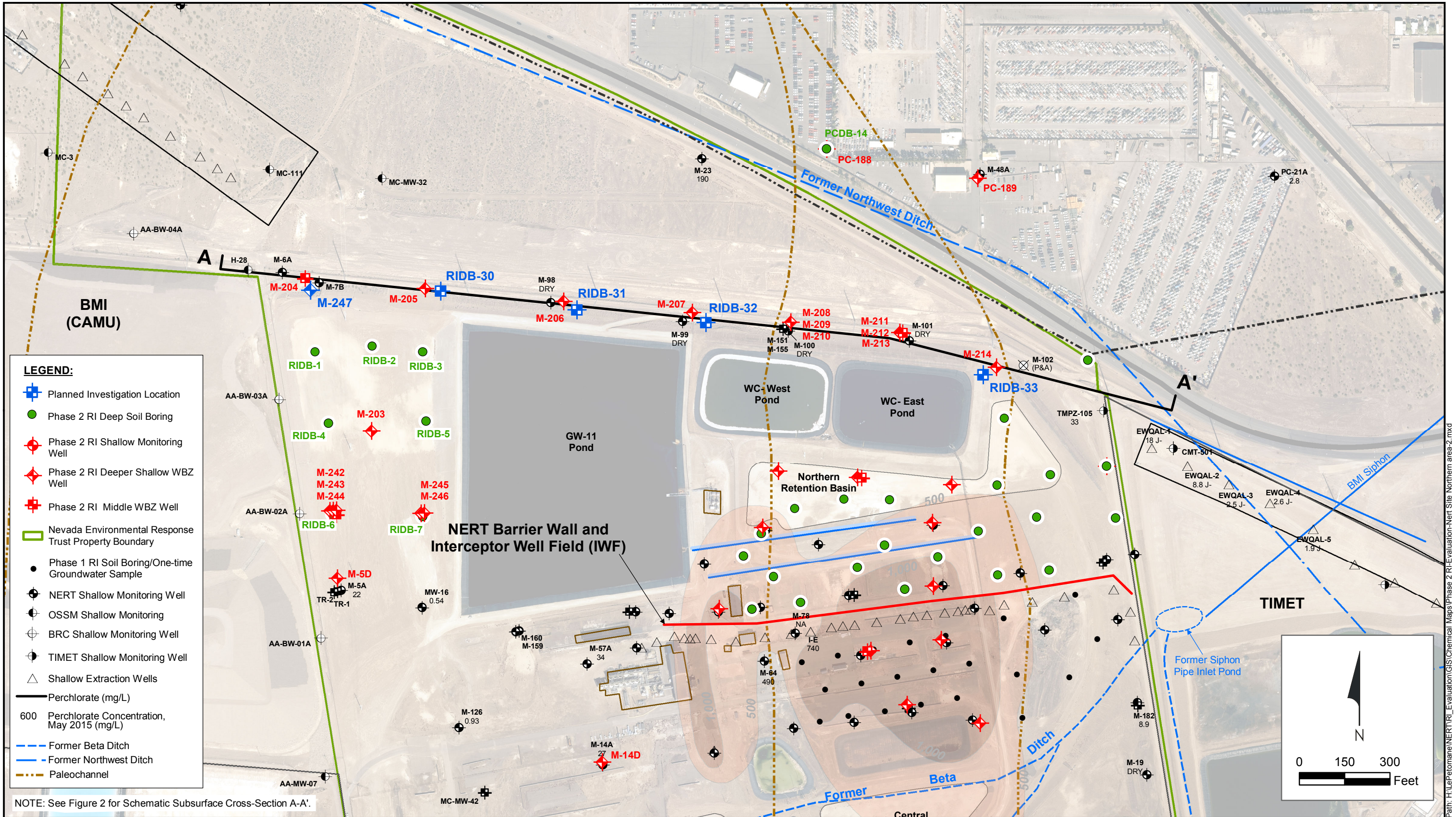
**Notes:**

See Figure 1 for investigation locations.

ft bgs: feet below ground surface

New wells will be sampled for the suite of Phase 2 RI parameters for new monitoring wells.





**LEGEND:**

- Planned Investigation Location
- Phase 2 RI Deep Soil Boring
- Phase 2 RI Shallow Monitoring Well
- Phase 2 RI Deeper Shallow WBZ Well
- Phase 2 RI Middle WBZ Well
- Nevada Environmental Response Trust Property Boundary
- Phase 1 RI Soil Boring/One-time Groundwater Sample
- NERT Shallow Monitoring Well
- OSSM Shallow Monitoring
- BRC Shallow Monitoring Well
- TIMET Shallow Monitoring Well
- Shallow Extraction Wells
- Perchlorate (mg/L)
- 600 Perchlorate Concentration, May 2015 (mg/L)
- Former Beta Ditch
- Former Northwest Ditch
- Paleochannel

NOTE: See Figure 2 for Schematic Subsurface Cross-Section A-A'.

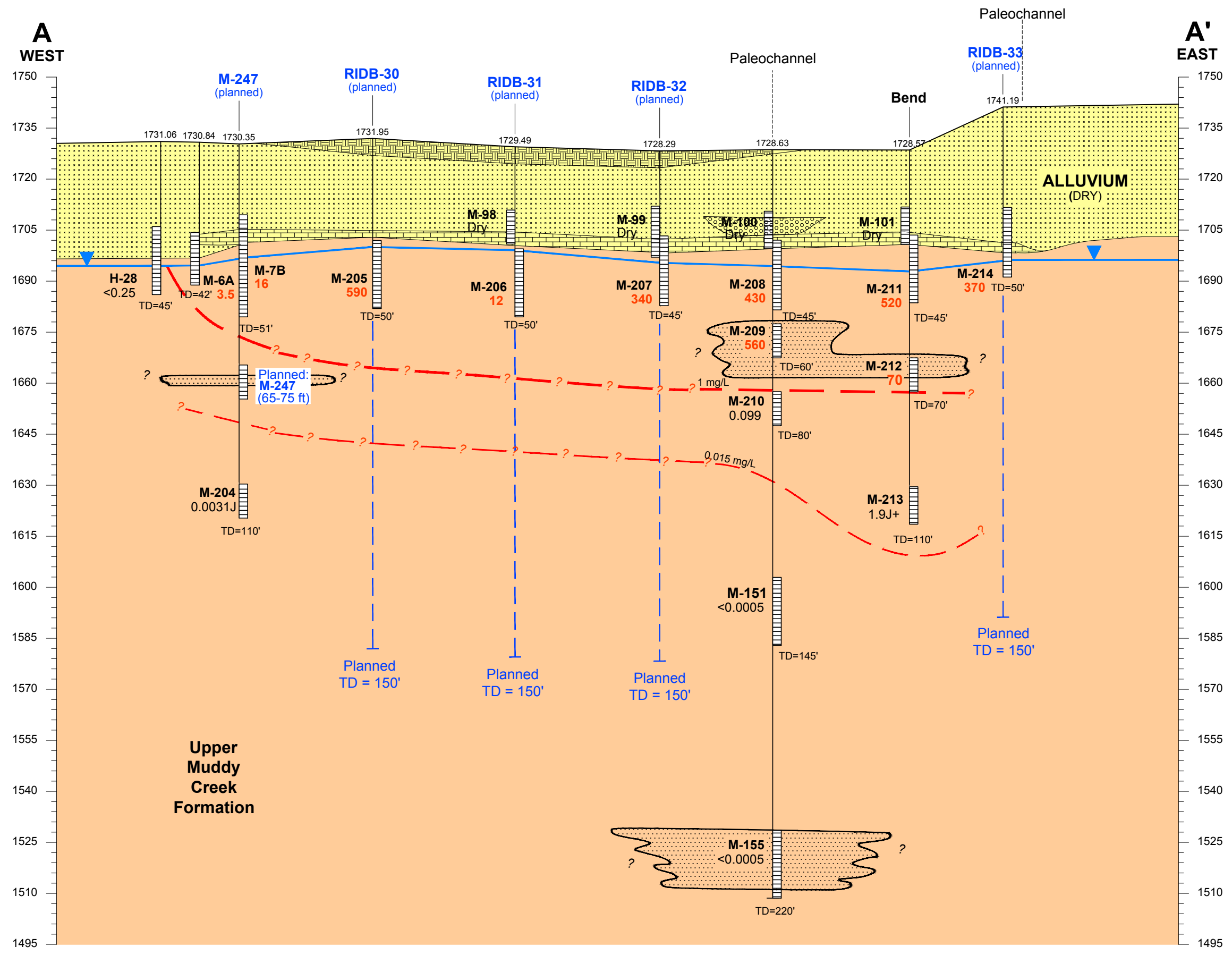


**Phase 2 RI Investigation - Modification No. 13**  
 Nevada Environmental Response Trust Site  
 Henderson, Nevada

Figure  
**1**

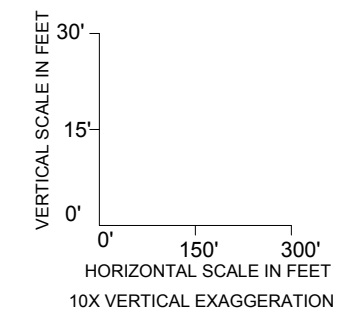
Path: H:\LePetomane\NERT\RI\_Evaluation\GIS\Chemical Maps\Phase 2 RI\Evaluation\Net Site Northern area 2.mxd





- Explanation:**
- M-206** Well name
  - 12** Perchlorate, mg/L
  - - - ? Approximate extent of perchlorate >1 mg/L
  - - - ? Approximate extent of perchlorate >0.015 mg/L
  - ▼ Groundwater Elevation (November 2017 - May 2018)
- Notes:**
1. Perchlorate concentrations above 1.0 mg/L are shown in red. The screening level for perchlorate is 0.015 mg/L.
  2. Planned investigation locations are shown in blue.
  3. TD = total depth.
  4. MSL Datum = Mean Sea Level Datum.
  5. Subsurface interpretation is preliminary; subject to change.

FILL	CALICHE
FILL	CALICHE
<b>ALLUVIUM (Gal)</b>	
GRAVEL/ SANDY GRAVEL	SILTY SAND/ SILTY GRAVEL
<b>UPPER MUDDY CREEK FORMATION (UMCF)</b>	
SILTY CLAY/ CLAYEY SILT	SILTY SAND/ SANDY BED



RMSO 8/3/18 Q:\DRAWINGS\2137300C\_NERT\_XSEC < A-A' SCHEMATIC CROSS SECTION >



**Schematic Subsurface Cross-Section A-A' Showing Northern NERT Site Boundary  
Monitoring Wells and Planned Additional Investigation Locations**  
Nevada Environmental Response Trust Site; Henderson, Nevada

Figure  
**2**

RI Phase 2 Modification No. 13  
Nevada Environmental Response Trust Site  
Henderson, Nevada

## RI Phase 2 Modification No. 13

### 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 system(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, Inc., not individually, but solely in its representative capacity as the Nevada Environmental Response Trust Trustee

**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:** 8/18/18

RI Phase 2 Modification No. 13  
Nevada Environmental Response Trust Site  
Henderson, Nevada

## **RI Phase 2 Modification No. 13**

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

### **Responsible Certified Environmental Manager (CEM) for this Project**

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 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, regulations and ordinances.



August 8, 2018

**John M. Pekala, PG  
Principal**

Date

Certified Environmental Manager  
Ramboll  
CEM Certificate Number: 2347  
CEM Expiration Date: September 20, 2018

