



May 9, 2014

Mr. Weiquan Dong, PE
Bureau of Corrective Actions, Special Projects Branch
Nevada Division of Environmental Protection
2030 E. Flamingo Rd., Suite 230
Las Vegas, Nevada 89119

**Re: Treatability Study Work Plan, Permeable Reactive Barrier Pilot, Revision 2,
Nevada Environmental Response Trust Site, Henderson Nevada, May 9, 2014
(NDEP Facility ID #H-000539)**

Dear Mr. Dong,

Please find enclosed the *Treatability Study Work Plan, Permeable Reactive Barrier Pilot, Revision 2*, dated May 9, 2014 (the "Work Plan") for the Nevada Environmental Response Trust (Trust) Site in Henderson, Nevada. This report was prepared by ENVIRON International Corporation (ENVIRON) on behalf of the Trust. This Work Plan was revised in response to comments received from the Nevada Division of Environmental Protection (NDEP) on March 17, 2014. An annotated response to NDEP's comments is attached to this letter.

Please contact John Pekala at (602) 734-7710 or Allan DeLorme at (510) 420-2565 if you have any comments or questions concerning this report.

Sincerely,

A handwritten signature in blue ink, appearing to read "John M. Pekala", written over a horizontal line.

John M. Pekala, PG
Senior Manager
CEM #2347, expires 9/20/2014

A handwritten signature in blue ink, appearing to read "Allan J. DeLorme", written in a cursive style.

Allan J. DeLorme, PE
Principal

Attachment

cc: BMI Compliance Coordinator, NDEP, BCA, Las Vegas
NDEP c/o Brian Giroux, McGinley and Associates, Reno

ec: James Dotchin, NDEP
Greg Lovato, NDEP
Nevada Environmental Response Trust
Tanya O'Neill, Foley & Lardner LLP
Joe McGinley, McGinley and Associate

Attachment

**Responses to NDEP Comments Dated March 17, 2014
Treatability Study Work Plan, Permeable Reactive Barrier Pilot, Revision 1,
Nevada Environmental Response Trust Site, Henderson, Nevada**

Responses to NDEP Comments Dated March 17, 2014
 Treatability Study Work Plan, Permeable Reactive Barrier Pilot, Revision 1,
 Nevada Environmental Response Trust Site, Henderson, Nevada

NDEP Comment	Response
<p>1. Section 3.2 Hydrology, pages 8-9. It would be expected that groundwater velocity based on an on-site, long-term aquifer test would carry more weight than a regional groundwater flow model. The difference between the velocities is an order of magnitude; please clarify the impact, if any, to the PRB design and evaluation.</p>	<p>Regarding the difference between the Errol and Montgomery pump test and the regional groundwater flow model, since the December 2013 work plan submittal, the regional groundwater model has been refined and now estimates a groundwater velocity in the candidate PRB study area of approximately 15 feet per day (ft/day). This is within the magnitude of groundwater velocities of 30 to 45 ft/day estimated by Errol and Montgomery from the testing performed in 2000.</p> <p>The purpose of the hydrology information in Section 3.2 is to provide a summary of the currently available information in the proposed PRB Study area. Long-term aquifer hydraulic tests are valuable, but are different than regional flow model estimates and should not be compared directly. As discussed in Section 5.2.3 (Single Borehole Dilution Testing) of the Work Plan (Revision 1), additional testing is planned at the candidate PRB location to provide a better measure of groundwater velocity at the candidate PRB location.</p> <p>In regards to the impact of groundwater velocity on the design of the PRB and as discussed in Section 5.3.4 (Establishment of Parameters for PRB Pilot Design) of the Work Plan (Revision 1), "The reactive zone must be large (i.e., in thickness and width) enough to allow the degradation. The thickness of the PRB is designed based on the required residence time of the contaminants and the groundwater flow velocity. The residence time must be sufficient to allow for degradation of the target contaminant(s) to reduce the contaminant flux (ITRC, 2011)." Accordingly, groundwater velocity will be a key parameter in the design of the PRB pilot.</p> <p>The text of Section 3.2 has been revised in the Work Plan (Revision 2) as follows:</p>

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NDEP Comment	Response
	<p>“The rate of groundwater movement in the area of the candidate PRB location has been estimated previously to be in the range of 30 to 45 ft/day (Errol L. Montgomery & Associates, 2000). Recent groundwater modeling performed by ENVIRON has resulted in estimates of groundwater velocity in the immediate vicinity of the candidate location for the Quaternary Alluvium of approximately 15 ft/day. Given the importance of groundwater velocity to the design and evaluation of the PRB pilot, as discussed in Section 5.2.3 (Single Borehole Dilution Testing) additional testing will be conducted at the candidate PRB location to provide a better measure of groundwater velocity at the candidate PRB location.”</p>
<p>2. Section 3.3 Groundwater Quality, page 9. This section discusses groundwater quality in very general terms.</p>	
<p>a. There is no discussion of the proposed site being immediately adjacent to the City of Henderson (COH) Bird Viewing Preserve (formerly COH RIBs) where treated wastewater has been disposed of for over 15 years. There is no discussion of the potential impact to the proposed in-situ PRB. For example, are the COH RIBs expected to have an impact on groundwater quality including DO, BOD, ORP, TOC, etc. and if so what are the implications to proposed evaluation</p>	<p>The following discussion has been added to Section 3.3 (Groundwater Quality) of the Work Plan (Revision 2):</p> <p>“The candidate location for the PRB (as shown in Figure 1, Figure 2a and Figure 2b) is situated adjacent to the bermed and lined ponds of a bird viewing preserve. Water levels and perchlorate concentrations have remained relatively stable in the vicinity of this location since 2011 (ENVIRON, 2013), when the infiltration basins were converted to bird ponds. Water to the ponds is supplied by the treated effluent from the POTW operated by the City of Henderson. A review of secondary effluent data provided by the City of Henderson shows an average detected concentration of nitrate, nitrite, and BOD at 14.39 mg/L, 0.03 mg/L, and 9 mg/L, respectively, for the month of January 2014 (Analla, 2014). Given their proximity, the ponds of the bird viewing preserve could have an influence on the local hydraulics and the water quality at the candidate location of PRB pilot and will be evaluated during the pilot test.</p>

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	<p>Groundwater quality, including the presence of electron acceptor species (e.g., oxygen, sulfate, manganese, nitrogen, and nitrate) in the vicinity of the proposed PRB pilot location will be further evaluated as discussed in Section 5 below. Baseline groundwater sampling and analysis is proposed as part of design activities for the PRB pilot and monitoring of groundwater elevations and groundwater quality in the vicinity of the PRB pilot is planned during operation of this system as discussed in Section 6.”</p>
<p>b. In addition to sulfate what about nitrogen species as electron acceptors?</p>	<p>The following text has been added to the text of Section 3.3 (Groundwater Quality) of the Work Plan (Revision 2)</p> <p>“Near the candidate PRB pilot location, nitrate concentrations ranged from 11 to 58 mg/L at MW-K5 and nitrate was detected at 21 mg/L at PC-103 (ENVIRON, 2013).”</p>
<p>c. Table 3 as referenced in Section 3.3. DO is recorded as 2.6 as N?</p>	<p>This was a typographical error and Table 3 has been revised in the Work Plan (Revision 2) to provide more current data.</p>
<p>d. Table 3 as referenced in Section 3.3. ORP values are reported as 1100 mV and 3520 mV, please verify these values.</p>	<p>This was a typographical error and Table 3 has been revised in the Work Plan (Revision 2) to provide more current data.</p>
<p>3. Section 4.0 Technology Overview and Rationale, page 10. There is evidence of elevated manganese both upgradient and downgradient of the proposed in-situ PRB. This comment is for information in terms of the existing redox environment.</p>	<p>The observations regarding elevated manganese concentrations are acknowledged. This will be taken into consideration in evaluating the redox conditions during the planned monitoring activities during the PRB pilot as discussed in Section 5 of the Work Plan.</p>
<p>4. Section 5.0 PRB Pilot Design, page 12. Please, also, refer to comment 2 (a). Prior to implementation, the NDEP requests a more detailed evaluation of field groundwater parameters (ORP, pH, DO, temperature) for the proposed test area.</p>	<p>Sampling and analysis of the monitoring wells at the candidate PRB pilot location is included prior to the deployment of the Stage 1 ISM units, and evaluation of this data will be performed prior to proceeding with the ISM testing. To clarify this, the text of Section 5.3.1 has been revised in the Work Plan (Revision 2) as follows:</p>

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NDEP Comment	Response
	<p>“Following receipt of the baseline analytical results, the results will be summarized and submitted to NDEP along with an evaluation of the planned PRB pilot activities included in this Work Plan. Following NDEP’s review and acceptance of this evaluation, the activities included in this Work Plan will proceed beginning with deployment of a series of ISM units in each monitoring well.”</p>
<p>5. Table 2. The McGinley & Associates maintains "All Wells Master" dated October 2013 that shows well PC-100R to be plugged and abandoned. The source data for the "All Wells Master" is the data submitted by all companies of the BMI area.</p>	<p>PC-100R was confirmed to have been abandoned in June 2003, and Table 2 of the Work Plan (Revision 2) has been revised to include the following footnote:</p> <p>“1. PC-100R was abandoned in June 2003.”</p>
<p>6. Figure 7. Preliminary Time Schedule for PRB Treatability Study. Upon approval of the PRB Work Plan from NDEP, this schedule should be converted from quarters to specific dates.</p>	<p>The following text has been added to Section 7 (Schedule) of the Work Plan (Revision 2):</p> <p>“Figure 7 presents a schedule of events based on an assumed NDEP review period of 60 days from the date of submission of this Work Plan to the NDEP. Following receipt of NDEP approval of this Work Plan, an updated time schedule that provides specific dates will be submitted.”</p>
<p>7. Appendix B. Please add the affiliation of John Pardue and W. Andrew Jackson.</p>	<p>The Research Laboratory Bench-Scale Testing Protocols work plan included in Appendix B was prepared by John Pardue and W. Andrew Jackson of Louisiana State University (LSU). The following text has been added to Section 5.3.3 (Bench-Scale Column Testing) in the Work Plan (Revision 2):</p> <p>“A protocol for bench-scale testing prepared by Dr. John Pardue and Dr. W. Andrew Jackson of Louisiana State University (LSU) is provided in Appendix B.”</p>