Comments on

Eco & Associates, 'Final Site-Specific Work Plan [Monitored Natural Attenuation] Brown & Bryant Superfund Site in Arvin, CA,' Contract No. W912PP-10-D-0014, Prepared for US Army Corps of Engineers, Albuquerque, NM, by Eco & Associates, Orange, CA, January 26 (2012).

Comments Submitted by G. Fred Lee, PhD, PE, BCEE, F.ASCE and Anne Jones-Lee, PhD G. Fred Lee & Associates TAG advisor to CBA March 29, 2012

In January 2012 Eco & Associates submitted the "Final Work Plan" for the Monitored Natural Attenuation (MNA) for the OU-2 at the B&B Superfund site. It is available online at: http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/3dc283e6c5d6056f88257426007417a2/9aea34c0a 94d8cf4882579980083aec5/\$FILE/BB%20Site%20MNA%20Plan%201_12.pdf This work plan is now under review by the US EPA and Citizens for a Better Arvin (CBA), that "Work Plan" presents background information on the characteristics of the site that are pertinent to understanding the proposed MNA approach for remediation of the B-zone; key information is noted herein.

Section 1.0 "Introduction" states (page 1),

"This Site-Specific Work Plan (SSWP) is prepared for monitored natural attenuation (MNA) evaluation at the former Brown & Bryant, Inc. (B&B) facility, in Arvin, California."

"This SSWP was prepared under Contract No. W912PP-10-D0014, Task Order 0008 in general conformance with the guidance of Performance Monitoring of MNA Remedies for volatile organic compounds (VOCs) in Ground Water, EPA/600/R-04/027 (USEPA 2004)."

Section 1.1 "Purpose and Scope of Work" states (beginning on page 1):

"The goal of monitoring and performance evaluation is to verify that there is demonstrated attenuation capacity to mitigate the COC [chemical of concern] concentrations over time and that the attenuation capacity is reasonably maintained to continue reduction of COC concentrations, allowing remediation goals to be met.

The following factors important for verification of remedy during process and performance monitoring will be considered and addressed:

- Wells in the B-zone that will be used for evaluation of MNA performance
- Methods to be used for evaluation of MNA performance
- Frequency of monitoring and an estimate of the time to reasonably define the attenuation mechanisms and the rates of attenuation
- Approach to transition from process to performance monitoring
- Conditions for reduction of the data requirements and the frequency of monitoring
- Alternatives for enhancements and considerations in case the attenuation rates are not satisfactory

Section 2.0 "Site Conditions and Background," subsection 2.1.1 "Previous Investigations," states (page 4):

"The following seven primary COCs were identified during the OU-1 investigation:

- Chloroform
- 1,2-dibromo-3-chloropropane (DBCP)
- *1,2-dichioropropane* (*1,2-DCP*) [sic]
- *1,3-dichloropropane (1,3-DCP)*
- 1,2,3-trichloropropane (1,2,3-TCP)
- Ethylene dibromide (EDB)
- Dinoseb

Subsection 2.1.2 "OU-2 Remedy" states (page 5):

"Seven alternatives were considered in the B&B Site OU-2 RI/FS. The Remedial Action Objectives for OU-2 that were identified when considered the alternatives were to remove or control groundwater contamination source in the A-zone, to restore B-zone groundwater to its potential use as a drinking water source, and to prevent future exposure to contaminated groundwater. Additionally, the relocation of the Arvin City Well CW-l to prevent exposure to contaminated groundwater is part of all alternatives except the No Action Alternative."

"The selected remedy for the B&B Site OU-2 as described in the ROD is presented below:

1. Relocate the Arvin City Well CW-1: Discontinued use of the Arvin City Well CW-1 (proper plugging and abandonment of the well) will eliminate the only known potential pathway for contamination in the A-zone and B-zone groundwater to infiltrate to the C-zone aquifer. The Arvin City Well will be relocated to an alternative location a suitable distance from the known B&B Site contaminant plume.

2. Monitored Natural Attenuation for Groundwater: The ultimate objective for the groundwater remedial action is to restore contaminated groundwater in the B-zone to its beneficial use. The B-zone groundwater could be used as a future source of drinking water, but it is not being used currently for this purpose either onsite or offsite. MNA for the groundwater in the B-zone is considered by USEPA to be an alternative means of achieving remediation objectives that may be appropriate for specific, well-documented Site circumstances where its use meets the applicable statutory and regulatory requirements. MNA is the reliance on natural attenuation processes to achieve Site-specific remediation objectives within a time frame that is reasonable compared to that offered by other more active methods. The natural attenuation processes that are at work in such a remediation approach include a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume or concentration of contaminants in soil or groundwater. The fate and transport model for the Site indicate that relatively fast flow and transport in B-zone aquifer, in conjunction with source reduction/ control in the A-zone, would attain COC concentrations below the Cleanup Levels (CL) within a reasonable timeframe."

Page 6 states:

"2.2.1 Site Geology and Hydrogeology

The geology at the Site is an alluvial deposit of alternating layers and mixtures of unconsolidated sands, silts, and clay. Soil underlying the Site to a depth of 80 feet generally consists of silty fine sand to fine sandy silt. Clean, well-graded sand lenses and thin seams of silty clay occur locally within these soils. The soils are thinly interbedded, with textural changes occurring every few vertical inches. These textural changes are also believed to occur laterally.

The Site geology has been divided into two zones, the A-zone and the B-zone. The A-zone includes unsaturated soil to depths of 65 to 75 feet below ground surface (bgs) and includes the first water bearing unit, the A-zone groundwater. The depth to the saturated zone (see groundwater depths in Table 3.1 which also presents a summary of well construction details) varied between 65 and 85 feet bgs during the January 2004 groundwater-sampling event. The base of the A-zone is a thin sandy clay layer from 75 to 85 feet bgs. The clay layer and the A-zone groundwater occur under the entire Site but disappear approximately 900 feet south of the Site.

The B-zone includes unsaturated soil below the A-zone and the second water-bearing unit (Bzone groundwater) at depths between 150 to 165 feet bgs. The B-zone extends to at least 250 feet bgs and ends at a clay layer, known as the Corcoran Clay, that confines the drinking water aquifer below it. The thickness of this clay layer beneath the Site is unknown.

Groundwater in the A-zone flows in a generally southern direction, with some mounding of the water table observed from the southwest corner of the Site extending south. The saturated thickness of the A-zone groundwater ranges from 0 to 10 feet. The groundwater velocity in the A-zone has been estimated at 53 feet/year. Slug test results suggest that a yield of less than 100 gallons per day can be expected for wells in the A-zone. Aquifer testing of three of the on-Site extraction wells showed a groundwater yield of approximately ¼ gallon per minute (gpm). This yield was unsustainable during the testing.

The B-zone groundwater is comprised of a series of water-bearing units. All of the wells in the B-zone were installed in the water-bearing unit located at approximately 170 feet bgs. The direction of flow in this unit is to the south, and the gradient is very flat (0.0004). Permeabilities are much higher than for the A-zone groundwater. Past pump tests indicated that wells could be pumped at 7 gpm for an extended period.

For reference, a schematic showing the typical thickness for the A-zone and B-zone are shown in Figure 2 and cross-section across the Site is presented in Figure 3."

Figures 2 and 3 from the Eco & Associates report are included in the appendix to these comments.

Page 8 states:

"4.0 Monitored Natural Attentuation [sic] Objectives and General Approach This MNA plan is for implementation of the OU-2 remedy and specifically to evaluate groundwater conditions within the B-zone to evaluate whether there is reasonable attenuation of COC concentrations in that groundwater. Details of the groundwater monitoring are presented in the Groundwater Monitoring Plan, and natural attenuation progress evaluation for the B-zone groundwater is discussed in this plan.

Specifically, this plan provides a description of the following activities:

- Collect groundwater data that will be used for the attenuation model.
- Perform groundwater trend analysis.
- *Prepare input for and implement the attenuation model.*
- *Evaluate the results of the attenuation model.*
- Prepare the MNA Performance Plan.

This plan describes the actual performance of the natural attenuation remedy. It is expected that, using a predictive model, the rate of COC attenuation can be described providing a measure to gauge progress. If monitoring data indicate that the COC levels do not continue to decline in accordance with expectation as defined by this model, USACE and USEPA will reconsider the remedy decision."

Information is presented on pages 8 and 9 on the general characteristics of the Attenuation Model. Section 5.2 "Data Needed for Attenuation Model" states (page 10): "All of the requisite data will be identified from sampling and analysis during the most recent groundwater sampling event and/or will be obtained from the RI/FS report (Panacea, 2005).

No additional sampling and analysis is proposed for MNA evaluation."

That statement is somewhat surprising based on the limited OU-2 B-zone groundwater aquifer characterization that has been done and on the complexity of the OU-2 aquifer. The Plan mentions that the basis for the Attenuation Model is the RI/FS report (Panacea, 2005): *"Panacea, Inc., 2005. 'Final Remedial Investigation/Feasibility Study of Remedial Alternatives,' Brown and Bryant Superfund Site, Arvin, California, dated September 2005"* contains a Panacea report:

Panacea, Inc., "Preliminary Fate and Transport Modeling – Final, Brown & Bryant Superfund Site, Arvin, CA," Prepared for US Army Corps of Engineers, Los Angeles, CA, prepared by Panacea, Inc., LaMirada, CA, June (2004).

that is available on the US EPA website for the B&B Superfund site at: <u>http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/3dc283e6c5d6056f88257426007417a2/11f476d4d</u> <u>68ae10d882579990001820d/\$FILE/F&T%20-%20BB%20OU2%20-%20RIFS%209_05.pdf</u>

We have reviewed this Panacea report and are providing comments in a separate report that is posted on the CBA website. As discussed in our comments, the Panacea report provides important information on the background to the approach that the US EPA adopted for remediation of OU-2.

G. Fred Lee has knowledge of groundwater fate transport modeling, especially the aquatic chemistry components of such models. We question the reliability of the proposed approach for developing the model input parameters because of the limited data available. As I understand it, the proposed approach for Modelling was developed by Panacea for the Corps of Engineers. We would like to understand the role of the fate transport modeling in making decisions on the effectiveness of the MNA approach for B-zone cleanup. It is likely that the trends observed in

the groundwater monitoring will be the key to evaluation of the effecteness of the MNA approach.

This comment was sent to the US EPA - B. Devali for which we received the follow comment.

"Regarding your comments: Glenn and I agree with you that it is a surprising approachactually it is incorrect. Of course we will considering any additional data that we have being collecting. We will also collect any additional data that is necessary for an effective MNA Plan.

FYI: Glenn and I went back to the MNA Workplan to read the sentence that you quoted and noticed that on the next page (11) there is another sentence that contradicts the first one in some ways: "Additional data may become available as supplemental site investigations are performed or groundwater monitoring network is enhanced. Such data may require that the MNA analysis be updated to verify that conditions are assessed and valid".

I will make sure we do not have those kind of absolutes in these kind of plans."

One of the issues of concern is whether there is a sufficient number of groundwater monitoring wells placed at appropriate locations to adequately evaluate the performance of the MNA approach. As we noted in our comments on the third five-year site review report, the current number and placement of monitoring wells are insufficient to justify the definition of the groundwater pollution plume given as definitive positions of the area polluted groundwater. As presented in the Eco & Associates MNA plan report is this firm's interpretation of the concentrations of COCs as concentration contours. These figures are appended to these comments.

The MNA Plan report presents the approach that is planned to be followed in plan review and evaluation, and provides a Project Schedule on page 18. The proposed components of the Plan development/evaluation appear to be adequate as a starting point for this evaluation. It is suggested, however, that a face-to-face meeting be held this spring to review and discuss the Plan, and to provide an opportunity for questions to be addressed before the Plan is accepted as final. Also, annual to biennial meetings of the interested parties should be planned to discuss the progress of the MNA. The period of review can be adjusted once it is possible to predict, based on past monitoring data, the concentrations in the monitoring wells. This issue was addressed with B. Davila to which she responded:

"Regarding meetings with the Corps/Eco & Associates and other Corps consultants to discuss MNA Plan development and evaluation before the MNA Evaluation Report is finalized in June: We had several meetings/sessions with them to scope and develop the plan.

Eco is supposed to submit a draft MNA plan in mid April; I will check on what is the schedule for that. Since we are closed to that date and also Glenn will be on vacation until mid April, I would like to offer the following: let's wait to get the draft see how it looks and we can meet here at the EPA offices to talk about comments. We may/may not have Eco and the Corps on the phone but Glenn will be here. If there is a delay in submitting the draft we can still arrange to have a meeting here."

We have notified the US EPA that this approach is satisfactory to us. We plan to provide additional comments on the MNA plan after the meeting to review the finalized MNA plan with the US EPA, in a month or so when scheduled by the US EPA.

The Eco & Associates report also presents a tabulation of groundwater monitoring data for the B&B Superfund site as an appendix, as well as supporting information on the background to the development and implementation of this plan. The reviewers of these comments may want to review those data as presented on the US EPA website at: http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/3dc283e6c5d6056f88257426007417a2/9aea34c0a 94d8cf4882579980083aec5/\$FILE/BB%20Site%20MNA%20Plan%201_12.pdf.

Page 12 contains a table of the cleanup levels for the COCs. The cleanup level listed for chloroform is 80 μ g/L. That concentration is much greater than a true risk-based level. The 80 μ g/L level is based on a drinking water MCL for trihalomethanes (THMs) (primarily chloroform) that was established at a level substantially higher than a risk-based level owing to the desire to balance the benefits of chlorination with the risks of cancer. The US EPA currently recommends 5.7 μ g/L as a carcinogen-risk-based criterion for chloroform in non-chlorinated drinking water (see http://water.epa.gov/scitech/swguidance/standards/criteria/health/draftfs.cfm. That is the cleanup level that should be used in the table of cleanup levels.

Figures 1–13 from the Eco & Associates that provide information on the characteristics of the B&B Superfund site, are provided in the appendix to these comments. Several of these figures provide additional information site geology and hydrogeology.

Appendix

Figures from Eco & Associates, "Final Site-Specific Work Plan [Monitored Natural Attenuation] Brown & Bryant Superfund Site in Arvin, CA," Prepared for US Army Corps of Engineers, Albuquerque, NM, by Eco & Associates, Orange, CA, January 26 (2012).

























