

Comments on  
Issues Discussed of US EPA/TAG May 1, 2012 Meeting on the US EPA CBA B&B Superfund  
Site Devoted to the Plan for Implementation of Monitored Natural Attenuation

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In January 2012 Eco & Associates a Corps of Engineers (COE) contractor for the B&B Superfund site investigation 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/3dc283e6c5d6056f88257426007417a2/9aea34c0a94d8cf4882579980083aec5/\\$FILE/BB%20Site%20MNA%20Plan%201\\_12.pdf](http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/3dc283e6c5d6056f88257426007417a2/9aea34c0a94d8cf4882579980083aec5/$FILE/BB%20Site%20MNA%20Plan%201_12.pdf)

On behalf of the Arvin Community for Better Arvin (CBA) we provided, Lee, G. F., and Jones-Lee, A., "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 to CBA by G. Fred Lee & Associates, El Macero, CA, March 29(2012).

[http://www.gfredlee.com/CBA\\_BBsite/2012/Eco\\_MNA\\_WP\\_comments.pdf](http://www.gfredlee.com/CBA_BBsite/2012/Eco_MNA_WP_comments.pdf)

in which we raised several technical issues about the proposed MNA implementation plan with the US EPA. We suggested that a meeting of the US EPA, CBA (Lee and Jones-Lee) and the B&B site contractor Eco & Associates be held to discuss the finalization of the work plan. Bruni Davila the US EPA Remedial Project Manager for the B&B Superfund site arranged for a May 1, 2012 meeting at the San Francisco offices of the US EPA. Bruni Davila, US EPA Region 9 hosted a meeting of B&B Superfund site project managers and consultants with the CBA TAG advisors on May 1, 2012. Participating in the meeting with her in the US EPA office were Drs. Anne Jones-Lee and G. Fred Lee, CBA TAG advisors, and via telephone conference call were Glenn Bruck, US EPA San Francisco Region hydrogeologist; Steven Ross, DTSC Project Manager; Jeff Brown, geologist, technical support DTSC; Cecilia Horner, civil engineer, US Army Corps of Engineers (COE), Albuquerque; David Henry, geologist who worked on arbor wells, COE Albuquerque; Carol Wies-Brewer, COE Albuquerque; and the following from Eco & Associates who serve under contract with COE, Mohammad Estin, PhD; Opjit Ghuman, CE, hydrogeologist; ? Zurab, modeling; Mitra Fiuzat, PhD, groundwater investigation & sampling." B. Davila organized the meeting and coordinated the meeting discussions. During the meeting representatives of ECO & Associates walked the participants through the eight page "TAG Meeting MNA Discussion"(meeting briefing document) that was prepared by Eco & Associates that the US EPA distributed the evening before the meeting that was made available to participants via email. A copy of this discussion is attached to these comments. During the meeting Drs. Lee and Jones-Lee asked questions and made comments about issues listed in the briefing document.

## Background Reports to Comments

Following the meeting we sent B. Davila, a list of our CBA reports that serve as background to our questions and comments as,

Lee, G. F., and Jones-Lee, A., Email to B. Davila, US EPA Region 9, Re: May 1, 2012 meeting on MNA at B&B Superfund Site, email from G. Fred Lee & Associates, El Macero, CA, May 1 (2012). [http://www.gfredlee.com/CBA\\_BBSite/2012/May1MeetingUSEPA.pdf](http://www.gfredlee.com/CBA_BBSite/2012/May1MeetingUSEPA.pdf)

which included the following list of our CBA reports that serve as a technical basis for many of the comments made by us at this meeting.

Lee, G. F., and Jones-Lee, A., "Comments on Eco & Associates, 'Cap Repair Completion Report, Final, Brown & Bryant Superfund Site, 600 South Derby Street, Arvin, California, Contract No. W912PP-10-D-0014 Task Order 0006,' Submitted to U.S. Army Corps of Engineers, Albuquerque NM, April 20 (2012)," Comments submitted to CBA by G. Fred Lee & Associates, El Macero, CA, April 26 (2012).  
[www.gfredlee.com/CBA\\_BBSite/2012/Cap\\_Repair\\_Rpt\\_comments.pdf](http://www.gfredlee.com/CBA_BBSite/2012/Cap_Repair_Rpt_comments.pdf)

Lee, G. F., Jones-Lee, A., "Comments on Groundwater Chloroform Pollution Issues for City of Arvin Well and B&B Superfund Site," Letter to Fernando Pantoja, Manager of City of Arvin Community Service Division, Letter report by G. Fred Lee & Associates, El Macero, CA, April 1 (2012). [http://www.gfredlee.com/CBA\\_BBSite/2012/ChloroformGroundwater\\_comments.pdf](http://www.gfredlee.com/CBA_BBSite/2012/ChloroformGroundwater_comments.pdf)

Lee, G. F., and Jones-Lee, A., "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 to CBA by G. Fred Lee & Associates, El Macero, CA, March 29(2012).  
[http://www.gfredlee.com/CBA\\_BBSite/2012/Eco\\_MNA\\_WP\\_comments.pdf](http://www.gfredlee.com/CBA_BBSite/2012/Eco_MNA_WP_comments.pdf)

Lee, G. F., and Jones-Lee, A., "Comments on 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," Comments submitted to CBA by G. Fred Lee & Associates, El Macero, CA, March 29(2012).  
[http://www.gfredlee.com/CBA\\_BBSite/2012/Panacea\\_FateTransModel\\_comments.pdf](http://www.gfredlee.com/CBA_BBSite/2012/Panacea_FateTransModel_comments.pdf)

Lee, G. F., and Jones-Lee, A., "Comments on 'Post-Closure Site Control Plan Including Operations & Maintenance Requirements, Brown & Bryant, Arvin Facility Superfund Site, First Operable Unit Remedial Action, Arvin, California,' Prepared by Morrison Knudsen Corporation, Irvine, CA, July 2000," Comments submitted to CBA by G. Fred Lee & Associates, El Macero, CA, March 16 (2012).  
[http://www.gfredlee.com/CBA\\_BBSite/2012/Postclosure\\_Site\\_Control\\_Plan\\_comments.pdf](http://www.gfredlee.com/CBA_BBSite/2012/Postclosure_Site_Control_Plan_comments.pdf)

Lee, G. F., and Jones-Lee, A., "Comments on Revised 'Operation and Maintenance Manual Brown & Bryant, Arvin Facility Superfund Site, First Operable Unit Remedial Action, Arvin, CA,' prepared for CA DTSC by URS Corp. Issued January 12, 2012," Comments submitted to CBA by G. Fred Lee & Associates, El Macero, CA, March 15 (2012).

[http://www.gfredlee.com/CBA\\_BBsite/2012/OM\\_Manual\\_comments.pdf](http://www.gfredlee.com/CBA_BBsite/2012/OM_Manual_comments.pdf)

Lee, G. F., and Jones-Lee, A., "Comments on 'Value Engineering Study – Brown & Bryant Operable Unit No.2 Superfund Site' developed by US Army Corps of Engineers for US EPA Region 9, dated March 22, 2010," Comments submitted to CBA by G. Fred Lee & Associates, El Macero, CA, February 12 (2012).

[http://www.gfredlee.com/CBA\\_BBsite/2012/value\\_engr\\_rpt\\_com.pdf](http://www.gfredlee.com/CBA_BBsite/2012/value_engr_rpt_com.pdf)

Lee, G. F., and Jones-Lee, A., "B&B Site Visit and Meeting with CBA and US EPA," Report to CBA from G. Fred Lee & Associates, El Macero, CA, January 18 (2012).

[http://www.gfredlee.com/CBA\\_BBsite/2012/BB-site-visit1-13-12Report.pdf](http://www.gfredlee.com/CBA_BBsite/2012/BB-site-visit1-13-12Report.pdf)

Lee, G. F., and Jones-Lee, A., "Comments on 'Third Five-Year Review Report for Brown and Bryant Superfund Site Arvin, California,' Prepared by: US Army Corps of Engineers Environmental and Munitions Center of Expertise, Omaha, NE, Prepared for: US Environmental Protection Agency Region 9, San Francisco, CA, dated September 2011, (made available by the US EPA January 5, 2012)," Report to CBA from G. Fred Lee & Associates, El Macero, CA, January 9 (2012). [http://www.gfredlee.com/CBA\\_BBsite/2012/USACE3rd5yrRpt-com.pdf](http://www.gfredlee.com/CBA_BBsite/2012/USACE3rd5yrRpt-com.pdf)

Overall from a CBA prospective this was a highly successful meeting which provided valuable information on the progress being made to develop the MNA work plan for remediation of the B-zone groundwater.

#### Summary of the Issues Discussed

##### Qualifications of Drs. Lee and Jones-Lee

A the start of the meeting a member of the COE raised a question on Dr. Lee's qualification to critically evaluate the adequacy and reliability of the US EPA, COE and its contractors work on the B&B Superfund site investigation/remediation. Dr. Lee responded with a brief summary of his educational background and professional experience that includes that following. He indicated that he obtained a bachelor's degree from San Jose State University with a major in public health, a Master of Science in Public Health from the University of North Carolina in Chapel Hill and a PhD degree in Environmental Engineering from Harvard University in 1960 with minors in aquatic chemistry and public health. For 30 years he held university graduate level teaching and research positions at several major universities where he conducted about \$0.5 million in research, and published over 500 professional papers/reports on water quality and aquatic chemistry issues and supervised over 90 graduate student's masters and doctoral thesis/dissertations. In 1989 he became a fulltime consultant where with Dr. Anne Jones-Lee who was also a university professor expanded their part time consulting activity into a fulltime activity through their firm G. Fred Lee & Associates. They serve as the principals for their firm. Over the past 23 years since retiring from university teaching and research they have been active in many water quality and solid and hazardous waste site investigation/remediation including serving as TAG advisor to public groups and agencies on federal NPL Superfund and other hazardous chemical sites across the US and Canada. They have published an additional about 600 papers/reports now for a total of over 1100 on their university research and consulting activities. Many of their papers and reports and additional information on Drs. G. Fred Lee and

Anne Jones-Lee qualifications to serve as TAG advisors on the adequacy of B&B Superfund site investigation/remediation are on their website [www.gfredlee.com](http://www.gfredlee.com).

#### Chloroform Remediation Level

Page 1 of the meeting briefing document lists under Chemical of Concern (COCS) Table 1-B-Zone Chemicals of Concern and Clean up Levels. This table lists chloroform as a COC for the B&B Superfund site with a Clean Up Level of 80 ug/L. As discussed in several of our reports on B&B Superfund site reports listed above. This table was prepared by Eco & Associates; this listing is technically incorrect as a remediation clean up level. The 80 ug/L should be used as a allowed concentration in a drinking water that has been treated by chlorination for disinfection. It is not an allowed clean up level for groundwater polluted by chloroform. This clean up level should be based on a cancer risk assessment concentration of about 1 ug/L. This issue has been discussed in several of our reports listed above.

Dr. Lee stated at the meeting that based on the recent groundwater water quality report that while there are questions about continuing to list chloroform as a COC for the B&B Superfund site there is elevated chloroform in offsite groundwaters that is likely from some other source. He also indicated at this time this elevated offsite groundwater chloroform has not polluted the City of Arvin water supply wells. Dr. Lee indicated that there will be need to continue to follow the location of the chloroform pollution plume to be certain that this continues to be the case. He also suggested that studies outside the B&B Superfund site studies need to be done to determine the source of the elevated chloroform in the groundwater near the B&B Superfund site.

#### Chloroform as a B&B site COC

Dr. Lee indicated that there are appropriate questions about continuing to list chloroform as a B&B Superfund site COC. As discussed in our reports the recent groundwater pollution data does not show chloroform at a concentration in the groundwater under the B&B site that is a threat to pollute groundwater with chloroform at concentrations of concern to the use of the groundwater for domestic purposes. The issue of continuing to list chloroform as a COC for the B&B Superfund site needs further discussion.

#### Update of B&B Superfund site COCs

Dr. Lee indicated that he and Dr. Jones-Lee are conducting a review of the need to update the COCs for the B&B Superfund site. He pointed out the current COCs for the site were based on analytical chemistry data that was collected over 20 years ago. He suggested that there is need to examine the site groundwater for new previously unrecognized pollutants in the site groundwater. Of concern are pollutant degradation products that were not examined for in the original COC definition as well as updated regulatory limits such as MCLs and hazardous chemicals risk based levels, OEHHA regulatory and Central Valley Regional Water Control Board limits need to be considered in reviewing the COCs for the B&B site. A representative of the COE at the May 1 meeting indicated that this type of review had been conducted in connection with the development of the OU-2 RI/FS for the site groundwater. Dr. Lee indicated that he and Dr. Jones-Lee will be examining the October 2011 groundwater monitoring data mentioned at the meeting and the OU-2 RI/FS to determine if the currently available groundwater monitoring data shows any constituents that should be considered as additional COCs for the B&B Superfund site.

### Reliability of USGS NAS MNA Model

Page 2 of the briefing document summarizes the potential use of the USGS NAS Model by Eco & Associates in evaluating the use of MNA at the B&B Superfund site. Eco & Associates mentioned that this model has been widely used in MNA evaluation at other sites. Dr. Lee asked for information on where this model had been found to be reliable for predicting the MNA at other sites. Eco & Associates staff stated that this model was based on the USGS MOD flow model that is widely used. Dr. Lee stated that wide spread use does not necessarily led to reliable results in predicting fate, transport and persistence of pollutant in groundwaters. Dr. Lee indicated that he has considerable expertise and experience in groundwater quality model evaluation through his previously serving as a member of the Journal Ground Water editorial board where he was responsible for reviewing papers on groundwater quality issues. Also Dr. Lee is currently a member of the Water and Environmental Modeling Forum steering committee. The CWEMF has as a primary focus review of the reliability of water transport and quality models including groundwater models for the Central Valley of California. Dr. Lee responded to a Eco & Associates staff statement about the widespread use of the USGS MOD flow model implying that it had been found to be a reliable model that the CWEMF has found that the this model has never been independently peer reviewed. This is an issue that is under review by CWEMF at this time. Information on CWEMF is available at <http://cwemf.org/>.

Dr. Lee stated as he has stated in his comments on the Eco & Associates MNA report reference above that modeling cannot be reliably used to evaluate the effectiveness of the MNA approach for remediation of the B-zone groundwater at the B&B Superfund site because of the large number of modeling parameters such as those listed on page 3 Table 2 Description of Parameters and Data Sources for which there is inadequate site specific information for the B-zone groundwater and the complexity of this zones aquifer system. The effectiveness of MNA will have to be evaluated based on the actual decrease in the concentrations of COCs in the B-zone groundwater over time through trend analysis.

Page 4 of the meeting briefing document presents Table 3 Value(s) Obtained for NAS Model that are to be used in the MNA modeling effort. It will be important that the range of the values found for the area groundwater needs to be evaluated/listed to understand the range of values that can impact the modeling results.

This table lists “Redox Indicators” where dissolve oxygen (DO), ferrous iron and sulfide are listed. Dr. Lee asked whether DO was present in the groundwater of the site. Eco & Associates staff indicated that the groundwaters of the plume area had measurable DO. Dr. Lee indicated that he was a postdoctoral fellow at Harvard University where he studied the reactions between DO and ferrous iron. He also indicated that one of his graduate students at the University of Wisconsin Madison Water Chemistry Program investigated the reactions between DO and sulfide. Based on these studies Dr. Lee indicated that with DO present in the B&B site groundwater there should be no ferrous iron and sulfide in the groundwater. An Eco & Associates staff member indicated that no ferrous iron or sulfide was found in the groundwater at the B&B site.

### Adequate Groundwater Monitoring Well Array

Eco & Associates staff stated that there are 23 groundwater monitoring wells in the B-zone groundwaters. With respect to using the existing groundwater monitoring wells to monitor MNA effectiveness, Dr. Lee asked whether there are a sufficient number of existing groundwater monitoring wells to adequately evaluate the effectiveness of MNA and to characterize the COC plumes. He indicated that based on his experience that there is need for additional monitoring wells to properly characterize these plumes. Contrary to the statement made in the Eco & Associate January 2012 MNA report there will be need for additional groundwater monitoring wells to better define the COC plumes in the B-zone groundwater. As the May 1 meeting Eco & Associates staff indicted that additional groundwater monitoring wells will be needed to properly evaluate the progress of the MNA approach. The Eco & Associates staff indicated that it has already found that through the development of four additional monitoring wells the COC plumes had spread further than previously reported. Dr. Lee indicated that there is need to perform a critical evaluation of the current monitoring well array for its adequacy in defining the COC plumes and especially any changes in these plumes as a result of decreased input of pollutants form the A-zone. This evaluation will require that a special evaluation/report be developed on this issue and periodically updated as additional groundwater quality monitoring data is obtained.

As discussed in our previous report referenced above it may be a number of years before there will be significant changes in the concentrations of COC in the B-zone groundwater because of the continued addition of pollutants from a A-zone. Because of the great uncertainty of the effectiveness of the removal COCs in the A-zone by the proposed larger diameter extraction wells that are scheduled to be install this summer it may be a number of years before the flux of COCs from the A-zone to the B-zone will be significantly decreased so as to impact the B-zone groundwater concentrations under the site.

#### Removal of A-zone COCs by Horizontal Wells

In connection with the removal of COCs in the A-zone Dr. Lee raised the issue of why the use horizontal extraction wells was not being used at the site. As discussed in Drs. Lee and Jones-Lee report reference above that the COE Value Engineering report suggested that horizontal extraction wells could much more effective in removing pollutants in the A-zone than the proposed smaller diameter vertical extraction wells. Both Dr. Bruck and Mr. Steve Ross indicated that horizontal extraction wells could be more effective than the vertical extraction wells. An Eco & Associates staff member stated that the problem with horizontal extraction wells is that it would be too difficult to control the position of the wells relative to the boundary between the A-zone and B-zone. Dr. Lee questions this assessment. Dr. Lee stated that in the mid 1990s he became familiar with the use of horizontal wells for monitoring of polluted groundwaters under landfills. Dr. Lee mentioned the use of horizontal wells to monitor groundwater for pollution under a landfill had been found to be effective. The approach was referred to as SEAMIST technology. There are several reports on this technology on the Internet under "SEAMISTTM Innovative Technology" Since then considerable progress has been made in the use of horizontal wells for groundwater remediation. A search of the Internet for "remediation of polluted groundwater by horizontal wells" presents several papers/reports on this approach. For example "Horizontal Wells in Groundwater Remediation ebook" January 6, 2012 edited by Jay Lehr and Jack Keeley <http://www.horizontalwelldesign.com/2012/01/horizontal-wells-in-groundwater-remediation-ebook/> Dr. Lee suggests that this issue be reexamined as an alternative to the vertical extraction wells for A-zone COC remediation.

Page 6 presents information on the Project Update where the approach for updating the MNA plan. Eco & Associates staff indicated that an MNA Evaluation report will be available in four to six weeks that will provide additional details on the MNA plan. It will be important to examine this updated plan and likely there will be need to hold a meeting of the group to review this updated plan.

#### Corcoran Clay Layer

Dr. Lee raised a question about the reliability of the Eco & Associates reports stating that the Corcoran Clay layer that separates the B-zone from the C-zone is present in the area of the B&B site. He indicated that based on discussion he had recently had with Dee Jasper of Dee Jasper and Associates, Inc. a Consulting Civil Engineering firm in Bakersfield, CA who works with the city of Arvin in developing additional water supply wells that a recently completed well did not find the Corcoran Clay layer. Dr. Lee indicated that this is an important issue since the Corcoran Clay layer retards the movement of pollutants from the B-zone to the C-zone which is the zone that represents the primary source of the Arvin groundwater water supply developed by the Arvin Community Services. Based on discussion with USGS on the Central Valley groundwater model the Corcoran Clay layer does not prevent the movement of pollutants to the groundwaters under this layer but retards the pollution of these waters.

#### Other Issues

##### Site Cap Inspection and Repair

Dr. Lee raised the adequacy of the current B&B site cap inspection and repair schedule. As discussed in our CBA report referenced above we find that the DTSC recently updated O & M Manual does not provide for adequate site cap inspection/remediation to prevent the types of cap integrity issues of the type have been found in the previous COE five year site reviews. S. Ross indicated that funding limitations prevented developing a more comprehensive site cap inspection/remediation. This is an issue that needs to be addressed to insure that adequate site cap inspection/repair occurs in the future.

Dr. Lee raised the issue of inadequate attention to remediation of animal burrows under the fence and cap. As discussed in our report cited above the same animal burrows were present in January 2012 during the site visit as were reported in the previous COE third five year review that was conducted in 2007. The COE staff at the May 1 meeting stated that each month the fence line is walked and all animal burrows are repaired COE staff from the Los Angeles District. Dr. Lee questioned this statement based on the repeatedly finding major cap repair issues as reported in the COE five year review reports. It is evident that physical barriers need to be constructed along the fence line to prevent animals from burrowing under the fence and cap. Also this fence line inspection should be added to the DTSC O&M manual checklist for the periodic inspection.

##### Institutional Controls Deed/Land Use Restrictions

Dr. Lee asked about the progress in developing institutional controls - deed restrictions for the future use of the site. Dr. Lee expressed concern that it will be important that institutional controls - deed/land use restrictions are effectively implemented forever since this B&B site is a capped waste pile that will be a threat to public health and groundwater quality for ever. S. Ross

indicated that attention will be given to developing this approach. This is an area that needs attention.

Comments on this meeting summary are welcome. Please send comments to [gfredlee33@gmail.com](mailto:gfredlee33@gmail.com).