Comments on

'Record of Decision Brown and Bryant Operable Unit No.2 Superfund Site,' US EPA Region 9, San Francisco, CA, September 2007

[http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/3dc283e6c5d6056f88257426007417a2/951b65b4f842e4fc8825736b006ee37e/\$FILE/B&B%20FINAL%20ROD%20September_%202007%2009-30-07.pdf]

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November 20, 2011

The Record of Decision (ROD) that describes the remedial measures selected to address groundwater contamination that resulted from pesticide reformulation activities at the Brown & Bryant Superfund site (B&B site) Operable Unit no. 2 (OU-2) is presented in 'Record of Decision Brown and Bryant Operable Unit No.2 Superfund Site,' US EPA Region 9, San Francisco, CA, September (2007)

[http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/3dc283e6c5d6056f88257426007417a2/

951b65b4f842e4fc8825736b006ee37e/\$FILE/B&B%20FINAL%20ROD%20September_%202007%2009-30-07.pdf].

Our overall comments on remedial measures considered and adopted for the B&B site are provided in our comments on the June 2007 proposed remediation plan for the site:

Lee, G. F., and Jones-Lee, A., "Comments on US EPA, 'Proposed Plan Brown & Brown & Bryant Superfund Site Operable Unit No. 2, City of Arvin, Kern County, California,' US EPA Region 9, San Francisco, CA, June (2007)," Report to CBA from G. Fred Lee & Associates, El Macero, CA, November 25 (2011).

as well as in other TAG Advisor comments provided on the Citizens for a Better Arvin (CBA **&B Superfund site** website [www.gfredlee.com/CBA_BBSite/CBA_BBSite.htm].

Presented here are excerpts from the ROD for OU-2, followed by additional comments:

"Part 1 Declaration" of the US EPA ROD document states:

"1.2 Statement of Basis and Purpose

This decision document presents the selected remedy for the Brown and Bryant Superfund Site (B&B Site) Operable Unit No. 2 (OU-2), Arvin Pesticide Reformulation Facility (Site) located in Arvin, California. The remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) (collectively referred to herein as CERCLA) and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record file for the B&B Site OU-2.

The State of California, acting through the California Department of Toxic Substances Control (DTSC) and the Central Valley Regional Water Quality Control Board (CVRWQCB), concurs with the selected remedy.

1.3 Assessment of Site

The response action selected in this Record of Decision (ROD) is necessary to protect public health or welfare, and the environment from actual or threatened releases of pollutants or contaminants from the B&B Site.

1.4 Description of the Selected Remedy

The remedial action for OU-2 at the B&B Site addresses contaminated groundwater. The overall cleanup strategy for the B&B Site is to reduce contamination in groundwater to protect human health and the environment. The contaminated groundwater in the B-zone above the cleanup levels noted in Part 2, Section 12.4.2 is considered to be a threat to human health and the environment at the Site. The selected remedy reduces the threat of further groundwater contamination within the B-zone groundwater by extracting and treating the groundwater in the shallower A-zone, the source of contamination in the B-zone groundwater. To remove the potential threat to human health, the selected remedy will also use monitored natural attenuation (MNA) in the B-zone groundwater, a potential source of drinking water; placing institutional controls on the Site and nearby properties to prevent the use of B-zone groundwater until such time as drinking water criteria are attained and, relocation of the Arvin City Well CW-1 to remove the threat of cross contamination from the A-zone and the B-zone to the C-zone as this well has potential to be a conduit. Extraction and treatment of A-zone groundwater was a component of the selected OU-1 remedy. However, additional investigation was necessary for adequate design and implementation of A-zone groundwater remediation component. Therefore, the A-zone groundwater extraction and treatment component of OU-1 selected remedy was not installed but was carried over to the OU-2 to be addressed in conjunction with actions for the Bzone groundwater. Therefore, this ROD for OU-2 is the Final ROD for the B&B Site groundwater remediation. The major components for the Selected Remedy include:

- Relocation of the Arvin City Well CW-1: Properly abandon the existing Arvin CW-1 and relocate a replacement well a suitable distance from the known B&B Site OU-2 plume.
- Installation of an extraction system in the shallow A-zone aquifer with above ground ultraviolet (UV)/oxidation water treatment and disposal of the treated water to the City of Arvin sewer system.
- Monitored Natural Attenuation: Conduct groundwater monitoring of the B-zone to evaluate: 1) the effectiveness of the remedy; 2) the location of the plume; and 3) that remediation goals have been met by natural attenuation in the B-zone. This component will include an MNA performance plan during implementation of the remedy, which will include details of the groundwater monitoring and natural attenuation progress evaluation for the B-zone groundwater. Actual performance of the natural attenuation remedy will be carefully monitored in accordance with the MNA Performance Plan. If monitoring data indicate that the COC levels do not continue to decline, as estimated in the fate and transport model, EPA and DTSC will reconsider the remedy decision.
- Place institutional controls on the Site and nearby properties to limit use of B-zone groundwater.

1.5 Statutory Determination

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action, is

cost-effective, and utilizes permanent solutions and alternative groundwater extraction and treatment technologies to the maximum extent practicable.

The remedy also satisfies the statutory preference for treatment as a principal element of the remedy (i.e., reduces the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants as a principal element through extraction and treatment).

Because the remedial actions at this Site will result in hazardous substances, pollutants, or contaminants in the groundwater remaining on site above levels that allow for unlimited use and unrestricted exposure, and will take greater than five years to attain remedial action objectives (RAOs) and cleanup levels, a statutory review will be conducted within five years after the initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

1.6 ROD Data Certification Checklist

The following information is included in the Decision Summary section of this ROD. The information in this ROD is from the Site Administrative Record, primarily from the Final Remedial Investigation/Feasibility Study of Alternatives (RI/FS Report), Operable Unit No. 2, Brown & Bryant Superfund Site, September 2005. Additional information can be found in the Administration Record file for the B&B Site.

- Chemicals of concern and their respective concentrations Page 2-26;
- Baseline risk represented by the chemicals of concern Page 2-29;
- Cleanup levels established for chemicals of concern and the basis for these levels Page 2-55:
- Conclusions that there are no source materials constituting principal threats at the site-Page 2-47;
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the baseline risk assessment and ROD: Page 2-23;
- Potential land and groundwater use that will be available at the site as a result of the selected remedy Page 2-54;
- Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected Page 2-51; and
- Key factor(s) that led to selecting the remedy- Page 2-48.

1.7 Authorizing Signature

Kathleen Salyer, Chief Superfund Site Cleanup Branch, U.S. Environmental Protection Agency, Region 9 Date 9/28/07

"Part 2 Decision Summary" of the US EPA ROD document states the following, beginning on page 2-47, concerning the remedy selected:

"12.0 Selected Remedy

The remedial action for the B&B Site OU-2 addresses contaminated groundwater. To remove the potential threat to human health, the selected remedy for groundwater will use a combination of methods to achieve the Remedial Action Objectives.

EPA presented seven alternatives in the Proposed Plan prepared for B&B Site OU-2. The Remedial Action Objectives for OU-2 are to: remove or control groundwater contamination source in the A-zone; restore B-zone groundwater to its potential use as a drinking water source; and 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.

A combination of Alternatives 2 and 3 were selected for the OU-2 remedy with respect to achieving drinking water MCL compliance in the B-zone groundwater. Alternative 3, consisting of the A-zone groundwater extraction and treatment, was a component of the selected OU-1 remedy in the 1993 OU-1 ROD, and was a carried over task from the OU-1. The actions in the 1993 OU-1 ROD for A-zone groundwater were interim actions. Additionally, decommissioning and relocation of Arvin City well CW-1, which is a part of all alternatives, except the No Action, will eliminate the only known potential pathway of A-zone and B-zone groundwater infiltrating the C-zone aquifer. The selected remedy is the final remedy for the B&B Site.

The selected remedy for the B&B Site OU-2 is presented below and is discussed in detail in Section 12.2 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 infiltrate 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. Alternative 2, Monitored Natural Attenuation for Groundwater: The ultimate objective for the groundwater remedial action is to restore contaminated groundwater in the Bzone 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 on-site or off-site. MNA for the groundwater in the B-zone is considered by EPA to be an alternative means of achieving remediation objectives that may be appropriate for specific, welldocumented 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 Azone, would attain COC concentrations below the drinking water MCL within a reasonable timeframe. This alternative would include appropriate evaluation process and contingencies to assure that MNA is functioning as intended. This alternative would also

- include additional necessary institutional controls, such as to restrict access to those portions of aquifers that are impacted and assure any wells completed in deeper zone are sealed through the A-zone and B-zone to prevent cross contamination to address potential health risks.
- 3. Alternative 3, A-zone Groundwater Source Reduction: This alternative consists of source reduction and control by dewatering the A-zone and treating the extracted water. In this alternative, several large diameter wells will be installed in specific strategic locations. The large diameter sump wells will be constructed by drilling 8-foot diameter holes at the selected locations to a depth of 75 feet or into the clay layer that separates the A-zone and B-zone. The extracted groundwater will be treated by an UV/Oxidation system located on-site. The treated water would be discharged to the Arvin City sewer. Alternatively, a service contract might be utilized for off-site treatment and disposal of the water, if such an approach is found to be cost advantageous.

EPA believes the selected remedy for the B&B Site meets the threshold criteria and provides the best balance of tradeoffs among the alternatives considered. EPA expects the selected remedy to satisfy the statutory requirements of CERCLA Section 121(b): 1) Protection of human health and the environment; 2) Compliance with ARARs; 3) Cost effectiveness; 4) Use of permanent solutions to the maximum extent practicable; 5) Application of source reduction, dewatering action in the A-zone as a principal component.

12.1 Summary of the Rationale for the Selected Remedy

The principal factors considered in choosing the selected remedy for groundwater are:

- 1. There is no known source material or non-aqueous phase liquids in the groundwater constituting a principal threat;
- 2. COC's in the A-zone groundwater are mobile and pose a threat to human health even though they exist at relatively low concentrations and can be confined to the A-zone and B-zone if the Arvin city well is properly plugged and abandoned;
- 3. Even though A-zone groundwater is not a current or a potential drinking water source, extraction and treatment of the A-zone groundwater is necessary as it is a source of contamination to the B-zone groundwater, classified as a potential drinking water source, and possibly to the C-zone groundwater that is a current source of drinking water:
- 4. Groundwater extraction in the A-zone with surface treatment of the water will control or eliminate the source of contamination to the B-zone groundwater by reducing the mobility, volume, and concentration of the contaminant plume.
- 5. MNA should reduce the mass, toxicity, mobility, volume, or concentration of contaminants in groundwater, specifically the B-zone groundwater.

12.2 Description of the Selected Remedy

The selected remedy for the B&B Site OU-2 is the combination of Alternatives 2, and 3, which are Monitored Natural Attenuation, and Source Mobility Reduction. The relocation of the Arvin City Well CW-1 to prevent future exposure to contaminated groundwater is a part of all alternatives, except the No Action; therefore, it is a component of the selected remedy. The various components of the selected remedy are described as follows:

Relocate the Arvin City Well CW-1: Eliminate the risk pathway by properly plugging and abandoning the Arvin City Well CW-1 and install a replacement well. The C-zone aquifer is the potable water aquifer used by the City of Arvin. The Arvin City Well CW-1 is completed with the production screen set below the B-zone and the Corcoran Clay layer but the well is reported to be gravel packed from 50 bgs (in the A-zone soils above the A-zone groundwater) to the total depth at 730 feet. This construction may provide a conduit for B-zone groundwater contamination to migrate into the C-zone.

This action consists of plugging and abandoning the CW-1 well and installing a replacement well outside the known extent of the B&B Site contaminant plume. This would eliminate the potential exposure pathway for contaminated groundwater ingestion.

Monitored Natural Attenuation for groundwater in the B-zone.

Monitored Natural Attenuation (MNA) refers to 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. These in-situ processes include biodegradation, dispersion, dilution, sorption, volatilization and chemical or biological stabilization, transformation, or destruction of contaminants. EPA does not view MNA to be a "no action" or "walk-away' approach, but rather considers it 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. The fate and transport model for the Site indicate that relatively fast flow and transport in the B-zone aquifer would attenuate COC concentrations below the drinking water MCL within a reasonable timeframe, if the source, which is COCs in the A-zone groundwater, is reduced or controlled.

MNA is typically used in conjunction with active remediation measures. For example, active remedial measures could be applied in areas with high concentrations of contaminants while MNA is used for low concentration areas; or MNA could be used as a follow-up to active remedial measures, such as source mobility reduction or source removal.

The use of MNA at a site does not preclude the use of "active" remediation of or the application of enhancers of biological activity (e.g., electron acceptors, nutrients, and electron donors).

The groundwater monitoring associated with the MNA will consist of sampling and analysis of key monitoring wells. Analytical results would be compiled and presented to EPA with interpretation and graphics showing COC concentration contour maps. The remedial action cleanup levels for the B-zone groundwater (drinking water MCLs) presented in Section 12.4.2 will be used as a guide for evaluating the natural attenuation process. The monitoring schedule will be quarterly during the first year, semi-annually during the second year, and annually thereafter. Monitoring frequency could be adjusted, depending on the analytical results and with EPA approval.

EPA will develop an MNA performance plan during implementation of the remedy. The MNA Plan will include details of the groundwater monitoring and natural attenuation progress evaluation for the B-zone groundwater. Actual performance of the natural attenuation remedy will be carefully monitored in accordance with the MNA Plan. If monitoring data indicate that the COC levels do not continue to decline, EPA and DTSC will reconsider the remedy decision. If monitoring and evaluations indicate that the B-zone groundwater COC concentrations are not attenuating as expected, after controlling the source of contamination (the COC impacted Azone groundwater) appropriate measures will be implemented to address contamination in the B-zone groundwater. The MNA performance plan will also include necessary monitoring requirements for contaminated groundwater plume containment evaluation. The purpose of the B-zone containment evaluation is to ensure that the groundwater contamination is not migrating, and becoming a risk to human health and the environment. Boundaries of the leading edge plume will be established for appropriate containment evaluation. If the containment evaluation indicates that the B-zone groundwater is migrating such that it creates a risk to human health or the environment, appropriate containment will be evaluated and contamination migration will be addressed. In addition, the effectiveness of the MNA program will be evaluated at the end of five years.

This alternative will also include additional institutional controls to address potential health risks and maintain effectiveness of remediation. These controls would include necessary deed and zoning restrictions (short-term or long-term) and/or permit requirements that will restrict access to portions of aquifers impacted by COCs to prevent exposure to contaminated water and spread of contamination. The objective of the institutional controls is to:

- prevent completion of wells in portions of aquifers impacted by COCs, and assure appropriate completion of wells in deeper aquifer (C-zone) to seal off impacted groundwater zones and aquifer units to avoid cross contamination,
- restrict well drilling and groundwater pumping within at least half a mile from the Site to ensure that pumping influences do not spread contamination and reduce the effectiveness of the remedy.

These controls will remain in effect until the remedy has restored the impacted groundwater to the cleanup levels. Specifics of the institutional controls, necessary to effectively implement the remedy and to address the potential health risks, will be assessed and developed during the remedy implementation.

A-zone Groundwater Source Reduction

This alternative consists of dewatering in the A-zone and treating the extracted water. The treated groundwater is then discharged to the Arvin City sewer. The most optimum location for such a dewatering system would be where either current groundwater depressions exist or where the B-zone aquifer is most impacted south of the B&B Site.

In this alternative, several large diameter wells will be installed off-site in the locations described above. Up to four large-diameter sump wells will be constructed by drilling 8-foot diameter holes at the select locations to a depth of 75 feet or into the clay layer that separates the A-zone and B-zone. Because this clay layer is relatively thin, field procedures will be required to ensure that penetration into the clay is minimal to avoid breaching it, but sufficient

to allow the well to serve as a sump for A-zone water. It is expected that about 1-foot penetration into the clay layer will allow these objectives to be met. The drill hole will be encased with a CMP Pipe and the lower 25 feet will be filled with gravel. A 12-inch poly-vinyl-chloride pipe that is open-screened in the gravel-filled zone will be installed to the base of the well for extraction of the collected water in the well.

It is expected that an average of 15 to 150 gallons per day of water may be extracted from the Azone using this approach. At peak this may approach or slightly exceed 1,000 gallons per day. There appear to be two options available to manage this extracted contaminated water: 1) temporarily store the water at the site and periodically transport off-site for treatment and disposal; and 2) use an UV/Oxidation treatment system installed at the non-RCRA cap portion of the site for treatment and discharge of the treated water to the Arvin City sewer. A cost-benefit assessment is needed at the time the remedy is implemented to assess which of these options is better.

In the design of the water pumping system, it will be required that the scheme allows for periods of time where the wells are dry. After several years of operation, it may be that the A-zone water occurs only on a seasonal and periodic basis. Because of the presence of the A-zone RCRA and non-RCRA caps, the replenishment of the A-zone from infiltration from the B&B Site areas will be limited allowing for little flushing of the soil contamination that remains. As the remediation progresses, site observations will allow better evaluation of the availability of water in the A-zone and the effectiveness of its dewatering. To the extent that methods are available to improve the process by increased "flushing" of the contaminants, these may be considered as system enhancements at a later stage.

Periodic monitoring of the A-zone and B-zone groundwater is needed to assess the changing site conditions and the impact of the installed remediation system. It is expected that this monitoring will extend until the OU-2 goal of limiting the B-zone groundwater to COC MCL levels is achieved and there is no further threat to the B-zone groundwater from the A-zone contamination. The remedial action cleanup level goals for A-zone groundwater (10 times the contaminant MCLs) presented in Section 12.4.2 will be used as a guide for evaluating the progress of the remedial action. It is estimated that it will take ten years to remediate A-zone groundwater so that it is no longer a source of contamination to the B-zone groundwater.

12.3 Summary of the Estimated Remedy Costs

Cost estimates for moving or replacing the Arvin City Well CW-1 and the two selected alternatives are summarized in Table 12-1. The capital costs, operation and maintenance costs, and periodic costs for these alternatives are described in detail on Tables 12-2, 12-3, and 12-4, respectively. These estimates for MNA Alternative 2 and Source Reduction Alternative 3 do not include the cost for moving or replacing the Arvin city well CW-1, since it is a part of all alternatives and is separately identified on Table 12-1 as a line item.

The cost data is based on the most likely estimate of costs for the three alternatives. Cost estimates include implementation of remedy, periodic monitoring, and assessment for effectiveness. These costs do not include ancillary costs such as permits and hazardous waste

transportation and disposal. Also, ancillary costs of oversight and interaction with third parties has not been included in the estimates. "

Table 12-1
Summary of Costs For the Selected Remedy

	Description	Estimated Costs		
Alternative		Capital and Periodic Costs	Annual O&M Costs	Most Likely Total Costs 1,2,3
-	Decommission existing well and Relocate City Well CWI 4	\$985,000	-	\$985,000
2	Monitored Natural Attenuation	\$550,000	\$525,000	\$4,237,000
3	Source reduction in the A-zone and No action in the B-zone	\$2,660,000 ⁵	\$1,700,000 ⁵	\$14,600,000 ⁵
TOTAL		\$3,645,000 ⁵	\$1,700,000 ⁵	\$15,585,000 ⁵

Comments

The use of large-diameter wells to enhance the removal of contaminants in the A-zone is a potentially viable approach that should be evaluated for its possible efficacy at this site. Monitored Natural Attenuation (MNA) may be effective in retarding migration of low levels of some pollutants in some areas for some period of time. However, this is not, overall, a reliable approach for remediating pollutants at the site or preventing migration of pollutants from the site for as long as the pollutants remain at the site. It will not control pollutants sufficiently to render groundwater in the area suitable for use as a domestic water supply or other purposes. It cannot be counted on to address the presently undefined threat to human health due to unmonitored, unregulated, or presently unknown hazardous chemicals that can still be in present in so-called remediated water. A combination of MNA and selected pump and treat approaches would be expected to provide more effective diminution of the offsite pollution of groundwater than MNA alone.

According to the ROD, the relocation of the Arvin City Well (CW-1) provision of the remediation includes the "discontinued use of the Arvin City well CW-1" as well as "proper plugging and abandonment of the well," measures that, "will eliminate the only known potential pathway for contamination in the A-zone and B-zone groundwater [to] infiltrate the C-zone aquifer." Proper sealing the city of Arvin well once it has been decommissioned can be effective in impeding the transport of polluted B-zone groundwater to the C-zone in the short term. However there are significant questions about the long-term effectiveness of well sealing, because the seal will be subject to deterioration due to chemical reactions that can occur in the seal. The effectiveness will need to be monitored effectively forever, and replaced as needed, to be certain that its effectiveness is maintained.

The ROD also states with regard to the relocation of the city well, "The Arvin City Well will be relocated to an alternative location a suitable distance from the known B&B Site contaminant plume." Owing to the current deficiencies in definition of the plumes of all of the contaminants of concern with respect to water supply water quality, great care and public oversight needs to be exercised in the selection of a suitable location for a new water supply well.

At several locations mention is made of that land-use restrictions/institutional controls will be applied at the site to prevent activities that could otherwise, at some time in the future, mobilize residual pollutants in the soil and groundwater so that they again become a threat to human health and water resources. While maintaining land-use restrictions/institutional controls will be important at the site, effective and reliable implementation of these controls for as long as waste residues remain at the site will be a key to minimizing that mode of impact of the site. Since the soil and groundwater can remain a threat to human health and water resources for very long periods of time, likely decades or more, a highly reliable approach for maintaining and evaluating the implementation of institutional controls will need to be developed

The USEPA ROD document for OU-2 provides summations of comments by other agencies and the public on the OU-2 ROD, and responses by the US EPA. Our comments are provided on section of the ROD are available in our TAG advisor report to CBA:

Lee, G. F., and Jones-Lee, A., "Comments on Part 3 Responsiveness Summary in 'Record of Decision Brown and Bryant Operable Unit No.2 Superfund Site,' US EPA Region 9, San Francisco, CA, September 2007," Report to CBA from G. Fred Lee & Associates, El Macero, CA, November 21 (2011).

[http://www.gfredlee.com/CBA_BBSite/2011/ROD-OU2-PubCommResponse-com.pdf]