Comments on
US Army Corps of Engineers (US ACE), "Second Five-Year Review Report for Brown and Bryant Site, Arvin, Kern County, California," US Army Corps of Engineers, Hazardous, Toxic, and Radioactive Waste Center of Expertise, Omaha, NE, Prepared for US EPA Region 9, San Francisco, CA, August 22 (2006)
http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/3dc283e6c5d6056f88257426007417a2/957f2e17f4059f7d8825727b006e2125!OpenDocument

Comments by
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The Executive Summary of the US ACE report "Second Five-Year Review Report" [Brown & Bryant Second FYR Text and Tables.pdf] states on pages vi–viii:
"*The U.S. Environmental Protection Agency (EPA) Region 9 has conducted the second five-year review (FYR) of the Brown and Bryant, Inc. (Arvin Facility) (B&B) Site in Arvin, California. The purpose of this FYR is to determine whether the remedial actions implemented at the site are protective of human health and the environment. This FYR is required because hazardous substances remain on-site above the risk-based levels determined in the Record of Decision (ROD), thereby preventing unlimited use and unrestricted exposure."*

"The site covers approximately five acres and is bordered on the east by irrigated agricultural fields on the north and south by food packing and shipping facilities, and on the west by a residential area. Two schools (Gospel Tabernacle of Arvin and Stepping Stones Child Care Center) and a park (Bear Mountain Recreation and Park Center) are within 0.5 mile of the site. The Morning Star Preschool, at 416 North Hill Street is within one mile of the site."

"Chemical contaminants have been detected in the surface soil, defined to include the upper seven feet of soil. This depth was selected because it corresponds to the depth where excavation might occur in the future for utility related work. Sampling results from the surface soil identified dinoseb as the only contaminant of concern. The principal area of highest concentration of dinoseb contamination occurs in the location of a former spill, along the east fence-line. High concentrations of dinoseb in surface soils were also found scattered in three other locations on-site and low concentrations were found over much of the site. The area of highest dinoseb contamination in the dinoseb spill area was remediated in 1991; however, some soil contamination exceeding health-based levels still remains in this area.

"Soil contamination from a depth of seven feet down to the A-zone groundwater was found over much of the site, but was primarily concentrated under four areas: the sump area, the dinoseb spill area, the waste pond, and a topographic low area between the pond and the large storage tank in the southwest corner of the site. Within these areas and over the entire site, six chemicals were identified as occurring at highest concentrations and to the greatest extent within the A-zone soils. These chemicals are 1,2-dichloropropane (1,2- DCP), 1,3-dichloropropane (1,3-DCP), 1,2-dibromo-3-chloropropane (DBCP), 1,2,3-trichloropropene (1,2,3-TCP), ethylene dibromide (EDB), and dinoseb. All of these chemicals except for dinoseb are volatile organic chemicals.

"Fifty-six (56) organic compounds were found within the A-zone groundwater samples and 11 were found in the B-zone groundwater samples. As identified in the first operable unit (OU-1) ROD, the primary chemicals of concern (COCs) include chloroform, DBCP, 1,2-DCP, 1,3-DCP, 1,2,3-TCP, EDB, and dinoseb.

"The remedial action was divided into a series of removal actions that included off-site disposal of remaining pesticide stock and drums, heavily contaminated soils, sumps, and removing the contents of tank UN-32 for off-site disposal. Tank UN-32 was cleaned and remains on-site. The OU-1 ROD (1993) addressed the site soils remedy and perched (A zone) groundwater via extraction and treatment, as well as monitoring the A- and B-zone aquifers. The OU-1 remedial action included the following components: removed contaminated soils remaining on site (a previous removal action excavated and disposed the most contaminated soil off-site), and consolidated the soils on the south side of the site under a RCRA cap; placed a non-RCRA asphalt cap on the remaining property; monitored the deeper B-zone aquifer and existing downgradient city drinking water well City Well (CW)-1 to ensure migration of contamination from the shallow aquifer does not occur."

"This FYR addresses the OU-1 remedy. A second operable unit (OU-2) will address the contaminated groundwater associated with the site, including the perched zone known as the A-zone aquifer, originally intended to be addressed by OU-1. Transferring the shallow groundwater component to OU-2 will require, as a minimum, an explanation of significant differences (ESD). The OU-1 remedy as implemented has two primary components: 1) a RCRA asphalt cap on the south portion of the site and a non-RCRA asphalt cap on the north part of the site, and 2) monitoring the A- and B-zone aquifers. The following issues are associated with the site: 1) Cracks, rodent holes, and ponding on the cap may allow surface water to migrate into contaminated soils under the cap and allow contaminated groundwater to migrate off-site. 2) Fencing has broken wire that may impact site security. 3) The vapor intrusion pathway may not be adequately evaluated. 4) Municipal well CW-1 may become contaminated so should be abandoned after a replacement well is installed. 5) Institutional controls (ICs) addressed in the ROD have not been implemented. 6) An optimized version of the previous monitoring program should be reinstated. 7) Active removal of contamination in the A-zone and unsaturated portions of the B-zone should be investigated to achieve accelerated site close out. 8) Transfer the shallow zone groundwater remediation from OU-1 to OU-2. 9) Update the current document repository.

"The remedy is considered protective in the short-term since there is no evidence of currently complete exposure pathways to contaminated soils and groundwater. However, in order for the remedy to remain protective in the long term, performance standards specified in the ROD must be met; ICs, as identified in the OU-1 ROD for the selected remedy, need to be implemented; and on-going groundwater monitoring should be conducted. As the vapor intrusion pathway is evaluated, ICs related to vapor intrusion issues may be suggested."

The "Five-Year Review Site Inspection Report" [Brown & Bryant Second FYR 8 15 2006 Site Inspection.pdf] Pages 5-6 describes the following conditions found during the inspection of the site:

"Rick showed the team around the site and highlighted some of the issues that were of primary importance which included:

- *the cracking present in the asphalt cap,*
- *the areas of poor drainage where ponding occurs,*
- *monitoring well damage and security,*
- *fence damage,*
- *accumulation of tumbleweeds against the fences.*

Cracking present in the cap may have occurred due to several factors, settlement in the soil beneath the cap, result of expansion and contraction cycles, or as a result of the magnitude 3.4 earthquake centered in the foothills north east of the site that occurred last year. To ensure the cracking did not occur as a result of the earthquake, Rick Lainhart surveyed the cap and documented the area and length of the cracks by spray painting the extent of the cracks and taking a digital image of each on six month intervals. The cracks have been propagating since the initial survey. The USACE has identified some options to fix the cracks concurrently with the ponding that occurs on the cap.

"Ponding at the interior of the cover is attributed to settlement while the large pounded area (approximately 100' x 200') on the east-central portion of the cover is due primarily to the primary outlet becoming blocked. The blockage occurs when the adjacent land owner grades the area next to the west security fence to prevent flooding an unimproved road. Optional outlet configurations are being evaluated by the USACE to allow water to drain from the cover even when grading activities similar to past practices are repeated. Additional ponding occurs west of the site warehouse in the west-central portion of the site. The warehouse on site is a "low-point" and water ponds against low asphalt berms constructed on the west side of the warehouse.

"The USACE construction manager indicated the current grades at the site are very flat and the easiest way to eliminate the interior ponding will require placing a top coat of asphalt and sand of adequate depth over the existing cover (rather than remove and replace the existing asphalt cover) while patching the cracks identified on the USACE crack surveys. The overlay will be of varying depth across the site, but will attempt to direct flow off the cap, eliminating the ponding and resulting infiltration. A new survey of the current conditions will be done this FY to; determine the existing grades over the site, used as a basis for designing the new drainage patterns, and determine the cost for the new overlay and other drainage improvements.

"There were approximately 4 locations where rodents had burrowed into the soil adjacent to the cap, but did not penetrate the cover or burrow beneath. A temporary ant infestation was also noted by the USACE Inspector in the RCRA cap next to a power pole anchor but is no longer present. The integrity of cap due to these actions has not been compromised.

"One monitoring well (PWB-2) south of the site was damaged as a result of a grader blade hitting the casing. The well has been repaired and protective bollards placed around the well. In an effort to make the casing and bollards more visible, they were painted bright yellow. The Construction Inspector is in the process of painting all above grade well casings and bollards yellow to improve visibility, and replace the locks on the wells to ensure they are always secured following sampling activities. Monitoring well PWB-7 south of the site was replaced in January, 2006 with a new well PWB-7A, after it was discovered the PWB-7casing was cracked. Well

PWB-7 was abandoned in accordance with state regulations. A significant number of monitoring wells were found to be unlocked and/or unlabelled. Most wellheads were in good shape, though a number of the protective casings are in need of paint. All but two monitoring wells were inspected and observations are provided in the following table."

Additional information on the deficiencies found by the US ACE in the B&B remediation is presented in the "***Five-Year Review Summary Form"*** ("Second Five-Year Review Report" Page x-xi) [Brown & Bryant Second FYR Text and Tables.pdf]

*"**Issues:***
Protectiveness Issues
1 Cracks present in asphalt cap, animal burrows and ponding water may allow water to migrate into contaminated soils under the cap and allow contaminates to migrate to groundwater.
2 Fencing has broken barbed wire strands that need to be repaired to maintain site security.
3 Vapor intrusion pathway for receptors in occupied structures off-site may not be adequately evaluated and addressed.
4 Due to the potential for contamination from the site, municipal well CW-1 should be abandoned and a new replacement well installed at another location
5 ICs need to be fully implemented.

Time/Cost Issues
6 Current monitoring program needs revision to reinstate periodic monitoring of a subset of the existing monitoring wells throughout the site but at a much less rigorous level than the original program in place from 2000 to 2004.

Technical Improvement Issues
7 A routine site-wide monitoring program that is not currently in place will provide information necessary to assess remedy performance.

Issues Related to Achieving Site Closeout
8 Significant contamination is present in the A-zone and potentially the unsaturated soils of the B-zone. Without active source treatment, the site will require long-term monitoring over an indefinite period of time and the mass may continue to migrate toward the drinking water aquifers.
9 The potential for contamination in the B- and C-zones will be reduced if the existing CW-1 is abandoned and replaced with another well.

Other Issues
10 Transfer the shallow zone aquifer remediation to OU-2.
11 Update the current document repository with all the pertinent submittals for the site.

Recommendations:
Recommendations to Improve Protectiveness
1 Fill cracks, plug rodent holes and regrade the cap
2 Repair site fencing, including restringing the three-strand barbed wire where broken.
3 Complete ongoing vapor intrusion sampling and evaluation

4 Install a new city well and abandon existing CW-1
5 Implement ICs, including an IC monitoring program, to prevent groundwater use in the affected area and to prevent inappropriate use of the capped area.

Recommendations to Reduce Remediation Cost
6 Develop a routine long-term monitoring program that provides for annual sampling of most of a subset of available monitoring points, quarterly sampling of two sentinel wells near the existing municipal well, and biennial sampling of background or upgradient monitoring points.

Recommendations for Technical Improvement
7 Re-implement a site-wide groundwater monitoring program at the site (at a level of effort suggested in recommendation 6 above).

Recommendations to Achieve Site Closeout
8 Evaluate source treatment options for the A-zone and the unsaturated portion of the B zone to decrease project life-span, and to make natural attenuation processes more effective at limiting increases in plume size.
9 Install a new city well, and properly abandon the existing CW-1.

Other Issues
10 Prepare an ESD to document that portion of the remedial action from OU-1 to OU-2.
11 Provide all pertinent documents to the repository located at the Beale Library in Bakersfield.

Protectiveness Statement:
The remedy at OU-1 is considered protective in the short-term, and currently protects human health and the environment because the asphalt containment cap limits potentially complete exposure pathways to contaminated soil and groundwater. However, in order for the remedy to be protective in the long-term, the following actions need to be taken:

- *performance standards specified in the ROD must be met;*
- *ICs, as identified in the OU-1 ROD for the selected remedy, need to be implemented; and,*
- *on-going groundwater monitoring should be conducted."*

The August 2006 B& B site inspection findings as summarized above are disturbing in that they show that the US EPA and the other RPMs have not established a sufficiently reliable program for ongoing site inspections, monitoring, and repair to provide for public health and environmental protection even in the near-term. The remediation approach followed by the US EPA of capping the wastes and contaminated soils must include the implementation of an aggressive monitoring, inspection, and remediation program.

Evidently there has been a contractor responsible for site monitoring. We should examine the current monitoring contract to see what is covered.

According to the "Second Five-Year Review Report" (Page 5-6) [Brown & Bryant Second FYR Text and Tables.pdf], *"As part of the 1993 OU-1 Remedial Investigation/Feasibility Study (RI/FS), EPA conducted a Baseline Health Risk Assessment (BHHRA) to determine the current and future effects of COCs on human health. BHHRA evaluated only the dominant exposure*

pathways and contaminants that may significantly contribute to the potential site risk. Dinoseb was selected as the only COC that may significantly contribute to the site risk and incidental ingestion of surface soil was selected as the dominant route of exposure. The exposure assumptions used to develop the BHHRA identified children and young adult trespassers and a construction worker as potential receptors. Dinoseb does not appear to be carcinogenic; however, the calculated noncancer hazards indicate that there may be concern for potential adverse health effects."

Beginning on page 6 the USACE "Second Five-Year Review Report" [Brown & Bryant Second FYR Text and Tables.pdf] provides a detailed discussion of the findings of the 2nd five-year review and remedial actions. Excerpts from that section are presented below.

"In May 1983, the CDHS inspected the Site to determine compliance with hazardous waste laws. At the time of the inspection, several violations involving storage, disposal, and transportation of hazardous waste were noted. Following the inspection, the CDHS directed B&B to correct the violations and conduct a site assessment. Between 1983 and 1988, B&B conducted site investigations under the supervision of CDHS. Limited cleanup work began under the supervision of the CDHS. In 1989, the B&B facility ceased operations. The Site was listed by EPA on the NPL of Superfund sites on October 4, 1989, and in that same year, all operations at the site ceased. Subsequently, various emergency and removal actions were initiated to minimize (or eliminate) immediate threats to human health and the environment (EPA, 1993a).

"Additional work was completed by others in support of the Southern Pacific Transportation Company and the Atchison, Topeka and Santa Fe Railway Company (hereinafter referred to as the responsible parties [RPs]). The groundwater and soil investigations at the Site were conducted in response to the EPA Unilateral Administrative Order. These studies were also incorporated into the EPA RI/FS findings.

"EPA completed the OU-1 RI/FS in May 1993. The EPA subsequently issued the OU-1 ROD in November of 1993. The selected remedy for OU-1 was consolidation of contaminated soil, installation of a RCRA/basic cap, and extraction and treatment of the A-zone groundwater. The goal of the remedial action was to prevent exposure to soil contaminated above health-based levels and to control the source of contamination to the B-zone groundwater (EPA, 1993d)."

*"**IV.A Operable Unit 1 – Soil and A-zone Groundwater***
IV.A.1 Remedy Selection
On November 8, 1993, EPA signed the ROD for OU-1. The stated objective in the B&B OU-1 ROD is to control migration of the contamination in the A-zone to deeper groundwater, and address the surface soil exposure threat. The cleanup goal is to reduce contamination levels in the A-zone to levels that would protect the B-zone groundwater. The principal threat considered in the ROD is the A-zone groundwater. The ROD selected remedy included a groundwater extraction, treatment and injection system, consolidating dinoseb contaminated surface soil on a 1.2 acre portion of the site and constructing a RCRA Subtitle C cap over it, and placing an asphalt cover over the remainder of the site. In addition to its primary cleanup goal of preventing exposure to contaminated soils, the asphalt containment cap was selected to prevent infiltration of precipitation and protect shallow groundwater from further degradation.

The cleanup standards selected in the ROD for the A-zone groundwater were set at 10 – 100 times the respective Maximum Contaminant Levels (MCLs) in order to keep B-zone levels at or below MCLs. The A-zone groundwater is not classified as a potential drinking water source.

Table 2: OU-1 A-zone Aquifer Clean-up Levels

Chemical	*Maximum Contamination Level (ppb)*	*A-zone Groundwater Clean-up Level Range (ppb)*
Chloroform	*100*	*1000 – 10,000*
1, 2-Dibromo-3-Chloropropane	*0.2*	*2 – 20*
1, 2-Dichloropropane	*5*	*50 – 500*
Dinoseb	*7*	*70 – 700*
Ethylene Dibromide	*0.05*	*0.5 – 5*
1, 2, 3-Trichloropropane	*40*[1]	*400 – 4000*

[1] *Chronic (lifetime) Health Advisory*

"The cleanup level for dinoseb in soil was placed at 80 milligrams per kilogram (mg/kg).

"The ROD also provides for implementation of ICs at the B&B site. The ICs will limit excavation in the RCRA capped areas to prevent residential development, and to otherwise avoid contact with contaminated soils. ICs which limit well installation on the B&B property or in areas of known contamination are not directly addressed in the ROD.

"There have been no ESDs for the site as of the completion of this FYR."

"***IV.A.3 System Operations/Operation and Maintenance (O&M)***
Operation and Maintenance activities consist primarily of groundwater sampling through a USACE contractor, Panacea that started in July 2000. Sampling frequency has varied at the site over the past 17 years. There have been periods of over two years between sampling events in the past. Through the early 2000s, quarterly sampling was conducted at many wells in the study area. After January 2004, sampling for all but two B-zone monitoring wells terminated. These two wells (WB2-4 and PWB-5) have been sampled monthly through November 2005. Prior to January 2004, most of the available wells on site were sampled, with the exception of several extraction/injection wells and the monitoring points installed to support past testing of those wells.

"The RCRA and containment caps, and security fencing were completed in 1999. Condition of the cap varies, as does the fence. There are numerous cracks in both caps that have been monitored by the USACE and in all cases are getting larger. There are areas of the non-RCRA

cap where water is ponding and is in need of regrading. Limited burrowing is evident at multiple locations around the perimeter of the cap, but does not appear to have damaged the caps.

"Current operational costs are included in Table 2. The annual cost identified in the OU-1 ROD for monitoring and cap maintenance was $66,000. Cost of the pump and treat system operation (not installed) was expected to cost approximately $808,000 annually for up to 10 years. Costs indicated below are estimated based on negotiated contracts with the monitoring contractor."

Table 3: Annual OU-1 System Operation Costs

Dates		Total Cost rounded to nearest $1,000
From	To	
March 2003	March 2004	$386,000
April 2004	May 2005*	$81,000
May 2005	May 2006*	$65,000

*Note: Sampling consisted of only Arvin Well CW-1, WB2-4, and PWB-5.

"IV.B Operable Unit 2 – Regional Aquifer Groundwater
No ROD has been signed for OU-2, the deeper, regional (B-zone) aquifer impacted by site contaminants. The OU-1 ROD envisioned that the risks posed by this deeper groundwater contamination would be addressed in a subsequent ROD:

> *"After the remedial investigation of the B-zone is complete and the extraction system in the A-zone is in operation, the final remediation levels for this B-zone will be determined within the … stated range that takes into account the cost effectiveness of the meeting the strictest goals in the A-zone groundwater cleanup range. The final remediation levels will be set in the final ROD (EPA, 1993)"*

Based on the apparent infeasibility of the groundwater extraction from the A-zone, a new decision regarding any treatment of the A-zone required by the ROD for OU-1 has been deferred to OU-2, the final remedy. EPA Region 9 is currently considering options for OU-2 and an ESD will be prepared to document the transfer of the shallow groundwater remediation from OU-1 to OU-2."

The USACE "Second Five-Year Review Report" [Brown & Bryant Second FYR 8 15 2006 Pg6-15.pdf] states that 11 additional wells were developed and were sampled during 2002 and 2003. The report states (page 11):
"These wells, and a number of pre-existing wells, were sampled on a quarterly basis until January 2004. After that time, only two wells, B-zone wells PWB-5 and WB2-4, were sampled on a monthly basis until November 2005 as sentinel wells for the nearby municipal well, CW-1. It appears that the additional wells have succeeded in adequately defining the extent of the groundwater contamination at the site. The only possible exception is the extent of B-zone contamination southeast of PWB-7. This well has been recently replaced, and recent sampling

results are still being assessed. The original well was abandoned in accordance with applicable state requirements.

"The site cap has been routinely inspected for cracking, animal burrows, settlement, and drainage. Site security has also generally been maintained and site fencing and gates inspected. The on-site warehouse building has also been maintained in a secure condition."

"VI. Five-Year Review Process" *(page 12)*
"VI.B Data Review
The available monitoring data for the site spans the period from September 1988 to November 2005. Though the entire dataset was qualitatively reviewed, the sampling results from July 2000 to November 2005 were quantitatively analyzed to identify trends in contaminant concentrations in both the A- and B-zones. These trends in the concentrations are a line of evidence regarding the performance of the site remedy installed to date. Data were analyzed for five of the most common site-related compounds representative of the mobility and toxicity of the suite of site contaminants."

"***VI.B.1 Relevant Trends***
In general, most wells showed stable to decreasing concentrations of the five compounds assessed, where they were detected above the method detection limit. This is consistent with the limited transport velocities and mobility of the site contaminants. However, specific wells in both the A- and B-zones displayed increasing concentration trends. These wells were generally located in the western portion of the study area and southwest of the main source areas. Other A-zone wells near or under the capped portion of the site also displayed increasing concentrations over the past five years. These results suggest contamination is still mobile, and that continued impacts on the B-zone due to leakage from the highly contaminated A-zone are still occurring in places. However, off-site wells located on flow lines from the site to the nearby municipal well do not show statistically significant (at the 90% level) increasing concentrations, and no impacts have been identified in the municipal well itself. Please refer to Attachment D for more information.

"***VI.B.2 Recommended Changes to Monitoring Programs***
The current monitoring program does not include routine sampling of any but two of the available monitoring wells. Routine sampling of a subset of the available monitoring wells should be reinstated to provide data for the next five-year review. A suggested monitoring program (well locations and frequency) is discussed in section 8.3 and presented in more detail in Attachment D."

*"**VI.C.1 OU-1 Summary***
"The asphalt non-RCRA cap at the site has shown evidence of cracking in spots, particularly on the northern and western edges, and there has been cracking along the southern and eastern edge of the RCRA-capped area. These cracks have been shown to enlarge over time. There is also significant ponding that occurs in the southeastern and western (west of the warehouse) portion of the non-RCRA asphalt cap. Drainage of the southeastern portion of the non-RCRA cap has been limited by off-site grading. The ponding on the cap represent potential infiltration,

should cracks appear in these areas. Animal burrows were also noted along (but not under) the edge of the asphalt cap."

*"**VII.A.2 Opportunities for Optimization***
As there are no active treatment processes on-going at the site, the primary optimization opportunity relates to the long-term monitoring program at the site. As discussed in section VI.B.2., routine sampling should resume at the site, but the number of wells and the frequency of sampling can be reduced from the program implemented in the July 2000 through January, 2004 timeframe. Annual sampling of most wells recommended for retention in the program would be adequate. This frequency would provide an adequate dataset for assessment of trends at the next five-year review and will support most site decisions. Quarterly sampling of the two sentinel wells near the municipal well CW-1 is appropriate given the likely timeframe available for initiating action to protect or replace that well once a significant impact to the sentinel wells is observed. Biennial or less frequent sampling would be appropriate for upgradient or background wells."

*"**VII.A.3 Implementation of Institutional Controls***
The OU-1 ROD identified the need for ICs that would limit exposure pathways to contaminated soil remaining on-site beneath the cap by maintaining the integrity of the cap. Specifically, Section VII of the ROD discusses elements common to all the action alternatives considered for the site and states, "to assure that the site remains safe after EPA completes the cleanup, deed restrictions or other ICs will be placed on the portion of the property having a RCRA cap to ensure that the cap remains safely intact and the soil under the cap remains undisturbed in the future."

"VII.A.4 Early Indicators of Potential Issues
Installed components of the OU-1 remedial action are functioning as proposed. There are some issues that require clarification to expedite site close out, or enhance the perceived protectiveness of the remedy. These items include:

- *The perched A-zone aquifer remediation has not been implemented as identified in the ROD. An evaluation of the monitoring data indicate there are areas where COC concentrations are increasing (refer to section VI and Attachment D).*
- *Cracks are present in the non RCRA and RCRA portions of the cap. These cracks may indicate the subgrade and/or soils under the asphalt may be settling. The cracks may allow water to seep into the contaminated materials and continue to act as a source for continued COC contamination to the A zone aquifer.*
- *Ponding is present at 3 locations over the northern portion of the site covered by the non-RCRA cap. Two of the locations allow ponding due to low areas, and the third is due to an obstruction at the point where runoff is to exit the cap. The obstruction is due to grading performed by an adjacent land owner.*
- *Rodent holes are present at several locations around the perimeter of the asphalt caps. There is a potential threat that these holes extend under the cap and could provide an unobstructed path for water to enter the contaminated soils below the cap and potentially mobilize contaminants.*

- *Soil gas surveys were completed in late 2005 and mid 2006 to determine if vapor intrusion should be a concern for current residences. Results from the first survey were inconclusive, and the results of the second survey were not available at the time this report was written.*
- *A more systematic monitoring program should be reimplemented at the site to allow subsequent FYR to evaluate the COC nature, extent and the remediation progress.*
- *There are legal resolutions in place to prevent well installation within the water district, there is not a clear process to flag a proposed well location as potentially within the plume. Either Kern County or the State Dept. of Health may issue a permit, depending on the use of the well. Coordination with those agencies is sporadic.*
- *Steps to complete implementation of all ICs should be taken. A site-wide ICs monitoring plan should be developed."*

"VIII.A Recommendations to Improve Protectiveness
VIII.A.1 Site Cap and Related Features
The most important recommendation for maintaining remedy effectiveness is to improve drainage of the capped areas to eliminate ponding on the surface. The current cracks in the cap should be repaired at least in accordance with the Operations and Maintenance manual for the cap (Morrison-Knudsen, 1999), in order to minimize infiltration through the cap. Animal burrows along the edge of the cap should be filled and sealed. The site fencing, notably the barbed wire topping the fence, should be repaired where broken.

"VIII.A.2 Evaluation of Vapor Intrusion Pathway
Exposure via vapor intrusion is of emerging concern and is currently being investigated at OU-1 at the request of the State of California's Department of Toxic Substances Control (DTSC). If the pathway presents an unacceptable risk, an additional remedy may need to be designed. Such a remedy may include the selection of new ICs.

"VIII.A.3 Replace Municipal Well CW-1
As a potential exposure point, the municipal well CW-1 should be replaced and the existing well properly abandoned."

*"**VIII.D Recommendations to Achieve Site Closeout***
VIII.D.1 OU-1
Under OU-1, though initially required by the 1993 ROD, no additional action have been undertaken to address mass in the soils and groundwater of the A-zone. The high concentrations in the A-zone source area wells are possibly indicative of residual nonaqueous-phase liquids that will likely represent a very long-term source of contamination downgradient of the site in the A-zone and, through vertical leakage, the B-zone. Without addressing mass in the A-zone, monitoring will be required essentially indefinitely, and potential future risk will remain. Active source treatment may significantly reduce the inventory of mass in the A-zone such that the limited vertical leakage of contamination to the B-zone will not result in concentrations in the B-zone representative of significant risk from future use of this potential water source. Though the A-zone groundwater is highly unlikely to achieve maximum contaminant levels or other risk-based goals, it is not a viable water supply. As such, implementation of active source remediation in the A-zone should be reconsidered.

"VIII.D.2 Regional Groundwater (OU-2)
As discussed in section VIII.A.3, replacement of the nearby municipal well should be pursued to eliminate this potential exposure route. No other recommendations regarding treatment of the B-zone to achieve site closeout are offered at this time."

*"**IX. Protectiveness Statement***
The remedy at OU-1 is considered protective in the short-term, and currently protects human health and the environment because the asphalt containment cap limits potentially complete exposure pathways to contaminated soil and groundwater. However, in order for the remedy to be protective in the long-term, the following actions need to be taken:

- *performance standards specified in the ROD must be met;*
- *ICs, as identified in the OU-1 ROD for the selected remedy, need to be implemented; and*
- *on-going groundwater monitoring should be conducted."*

Overall we find that the USACE August 2006 "Second Five-Year Review Report" for the B&B Superfund site was well done.