Comments on
"EPA Superfund Record of Decision: Brown & Bryant Arvin Facility First Operable Unit"
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The US EPA issued the "decision document," "EPA Superfund Record of Decision: Brown & Bryant Arvin Facility First Operable Unit" in November 1993. The findings and basis for the remediation decisions, and the purpose for the report were summarized in that document's "Statement of Basis and Purpose" section as follows:

"Statement of Basis and Purpose
This decision document presents the selected remedial action for the Brown & Bryant, Arvin facility in Arvin, California, which was chosen in accordance with CERCLA, as amended by SARA, and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the administrative record for the site.

The State of California concurs with the selected remedy.

Assessment of the Site
Actual or threatened releases of hazardous substances from the site, if not addressed by implementing the response action selected in the Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare or the environment.

Description of the Selected Remedy
This operable unit is the first of two planned operable units for this site. The first operable unit addresses the surface soil, the subsurface soil and the shallowest groundwater unit, the A-zone groundwater. The function of this operable unit is to address the principal threat at the site, the A-zone groundwater, and to address the surface soil exposure threat.

The major components of the selected remedy include:
- *Extraction, treatment and reinjection of the shallowest groundwater unit;*
- *Consolidating contaminated surface soil on a 1.2 acre portion of the site and constructing a Resource Conservation and Recovery Act (RCRA) Subtitle C cap over it; and*
- *Capping the remaining portion of the site with a basic cap.*

Statutory Determinations
The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy uses permanent solutions and alternative treatment

technology to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted every five years after commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

John Wise Date Deputy Regional Administrator   11-8-93"

The ROD provides detailed information on the approach that the US EPA adopted for the initial remediation of the B&B Superfund site. Excerpts from the ROD that describe that approach follow:

"***IV. Scope and Role of Operable Unit within the Site Strategy***
EPA has divided the site into two operable units. The first operable unit includes the current source of contamination, the A-zone groundwater, and the surface and sub-surface soils. The second operable unit includes the deeper groundwater units.

The response actions selected in this ROD address the first operable unit. Response actions for the surface soils constitute a final remedy for the surface soils. The actions for the subsurface soil and the first groundwater are interim actions.

The primary objective for the subsurface soils and the A-zone groundwater response action is to control migration of the contamination in this zone to deeper groundwater. Based on the water production rates, the A-zone groundwater is not legally classified as a potential drinking water source. However, the B-zone groundwater is classified as a potential drinking water source. Therefore, the clean-up goal is to reduce the contamination levels in the A-zone to levels that would protect the B-zone groundwater. The A-zone has caused chemical levels in the B-zone groundwater to exceed maximum contamination levels set by EPA.

The A-zone groundwater is classified as a principal threat at the site. A principal threat is characterized as a waste that cannot be reliably controlled in place, such as liquids and high concentrations of toxic compounds (e.g. several orders of magnitude above health based levels). The response action for the A-zone groundwater satisfies the statutory preference for remedies employing treatment that reduces toxicity, mobility, or volume as a principal element.

The primary objective of the surface soils response action is to prevent human and ecological exposure to the contaminated soil. The most contaminated soil was addressed in an emergency response removal in 1991. The remaining surface contamination is not considered a principal threat because it is not highly mobile, is not several orders of magnitude above health based levels and can be effectively controlled in place. The response action for the surface soils includes consolidation of soils exceeding health-based levels onto the southern portion of the site, containment (capping) and institutional controls.

V. Summary of Site Characteristics

The geology at the site is an alluvial deposit of alternating layers and mixtures of unconsolidated sands, silts and clay. The stratigraphy is very heterogeneous and layers tend to be discontinuous. The site geology has been divided into two zones. The A-zone includes unsaturated soil to 65 to 75 feet below ground surface (bgs) and includes the first groundwater unit, the A-zone groundwater. 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 within 900 feet south of the site. The B-zone includes unsaturated soil below the A-zone and the second groundwater or the B-zone groundwater at 150 to 155 feet bgs. The B-zone extends to at least 250 feet bgs and ends at a clay layer known as the Corcoran Clay which confines the drinking water aquifer below it. The thickness of this clay layer at the site is unknown. (See figure 3 for Conceptual Cross-section)

Surface Soil

Surface soil is defined to include the upper seven feet of soil. This depth includes a "construction zone", a depth where excavation might occur in the future for utility work. Sampling results from the surface soil identified dinoseb as the only contaminant of concern. The principal hot spot 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 cleaned in 1991; however, some soil contamination exceeding health-based levels still remains in this area.

Subsurface Soil

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 three areas: the sump area, the dinoseb spill area, and 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 three 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), dibromochloropropane (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.

Dinoseb was found concentrated in the top 30 feet of the spill area and then declined significantly in concentration down to the A-zone groundwater. In the pond and sump areas, the concentrations were significantly less than in the spill area.

Volatile organic contaminants were found in the subsurface over the entire site but were found in highest concentrations in the sump area. One boring in particular, boring I (located in the center of the sump), stands out for its exceptionally high concentrations. These contaminants were also found at significant levels in the area of the waste pond, and then were found in only relatively small concentrations elsewhere at the site. In the sump area, concentrations were highest from 20 and 30 ft bgs, but were also found at concentrations greater than 1,000 ug/kg over most of the A-zone within this area. 1,2-DCP was the volatile contaminant found at highest concentrations, *followed by DBCP, TCP, EDB, and 1,3-DCP. In the area of the pond, concentrations were highest from 30 to 40 ft bgs, but in general were found fairly evenly distributed over the A-zone.*

A-zone Groundwater
The same six chemicals found in the subsurface soils plus chloroform, were found in high concentrations in the groundwater. EPA's investigation determined that the total mass of contamination in the A-zone groundwater is significantly larger than was found in any other contaminated media at the site. Concentrations for each of the seven contaminants, except for 1,3-DCP, were found at levels as high as 1,000 to 100,000 ug/l. The highest concentrations were consistently observed in well AMW-2P, located near the sump, and at well WA-6, which is directly west of the sump, and at wells AMW-1P, EPAS-2 and EPAS-3, which are all located near the pond. The distribution of contaminants was consistent with the locations of the major source areas and follow a pattern consistent with the groundwater flow in the A-zone. In general, contamination was observed at slightly higher levels at wells near the pond when compared with the wells near the sump; 1,2-DCP was a notable exception. 1,2-DCP was found to be the most wide ranging contaminant in the A-zone groundwater and was at higher concentrations than any other contaminant. It was found over an area of approximately 5 acres at concentrations greater than or equal to 50 ug/l, or ten times the maximum contaminant level (MCL), and was detected at concentrations as high as 100,000 ug/l in well WA-6. The other six contaminants were also found over large portions of the A-zone groundwater unit, though to lesser extent than 1,2-DCP.

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. Water levels measured during the RI have shown a steady decline in the water table, probably as a result of the long drought in California. The saturated thickness of the A-zone groundwater is from 0 to 10 feet. The hydraulic conductivity in this zone was measured at low levels of 10[-4] to 10[-6] cm/s, and from a slug test the groundwater velocity was estimated at 53 feet/year. Extraction of contaminated A-zone groundwater for site remediation is expected to be difficult due to its low permeability and thinness. Slug test results suggest that a yield of less than 100 gallons per day can be expected for wells in this groundwater unit.

B-zone Groundwater
The B-zone groundwater is actually composed of a series of groundwater units. All of the new wells in the B-zone were installed in the B-2 groundwater 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. The pump test indicted that wells could be pumped at 7 gpm for an extended period.

In the B-zone, 1,2-DCP was also observed at levels significantly higher than any other contaminant and was observed at least once in every well. The highest observed concentration of 1,2-DCP in the B-zone was 1,700 ug/l in well WB2-1, which is directly south of the site (the MCL for 1,2-DCP is 5 ug/l). Except for chloroform, the other principal contaminants from the A-zone groundwater were also observed in the B-zone, though all at concentrations below 100 ug/l.

Fate and Mobility

The fate and transport of contaminants at the site are controlled by chemical specific properties and environmental characteristics and the interaction of these factors. Except for dinoseb, which is non-volatile, the key site contaminants are all volatile organic chemicals. All of the contaminants are relatively mobile in the environment. The volatile contaminants are transported in the environment as gases or in solution, whereas dinoseb is transported primarily in solution in the subsurface and in either solution or adsorbed to soil at the surface. All of the chemicals are weakly absorbed in soil, although the adsorption of dinoseb is pH dependent.

Probably the most important environmental factors influencing the fate and transport of contaminants at the site are the geology and the amount of water infiltrating into the A-zone. The site geology is a heterogeneous mixture of different soil types characteristic of an alluvial geology typical of that region. This type of geology results in a high degree of variability both vertically and laterally in the permeability of the soil material, which in turn results in spacial variability in the rate of contaminant transport at the site. Within the A-zone it was generally observed that finer grained sediments are more common below 30 feet until the A-zone groundwater is encountered. The base of the A-zone is a thin, mostly sandy clay unit that retards downward water movement.

Groundwater flow within the A-zone is very slow as a result of a low hydraulic conductivity. However, local variations in flow are expected due to difference in the lithology of this water bearing unit over the site; higher hydraulic conductivities are expected at the south-east side of the site where more sand was observed within this unit. Patterns of contaminant distribution in the A-zone groundwater are generally consistent with the direction of groundwater flow. The exact nature of water movement between the A-and B-zone is not known. The A-zone is expected to be leaky and it may be that there are preferential downward flow paths where the clay layer at the base of the A-zone thins out. At a soil boring located 900 feet south of the site this clay layer and the A-zone groundwater were not observed.

The infiltration of water into the A-zone is important because of its impact on contaminant movement in the vadose zone and as a source for the groundwater in the A-zone. The transport of dinoseb in particular is directly related to the amount of water infiltration because of its high solubility and low volatility.

This section provides the specific components of each alternative and explains the remediation

VI. Summary of Site Risks

Site risks were formally characterized for the surface soil. A screening risk assessment was conducted for these areas to analyze only the dominant pathways and contaminants that may significantly contribute to site risk. Risks from ingestion of contaminated surface soil were characterized for a child and young adult, and risk from ingestion of contaminated soil in the construction zone was characterized for an adult worker. Each of these exposure scenarios exceeded the threshold for deleterious effects to human health for the maximum detected concentration and only the child exposure scenario exceeded the threshold for the average detected concentration.

The other dominant pathway of concern at B&B is potential exposure from ingestion of contaminated groundwater either as a result of contamination reaching the city well or from future use of the B-zone groundwater; there is no current exposure to contaminated groundwater above health levels. The screening risk assessment did not characterize this risk. Instead, concentrations in groundwater and predicted impacts from the modeling results were compared to drinking water maximum contaminant levels (MCLs) or other published health-based levels where MCLs are not available. Contaminant levels in the B-zone groundwater exceeded MCLs in two wells for both 1,2-DCP and DBCP. Concentrations in the A-zone groundwater exceeded MCLs by orders of magnitude; however, because the A-zone groundwater is not a potential drinking water source, the concentrations are more important for characterizing the A-zone groundwater as a contaminant source that threatens the B-zone groundwater.

Based on data from the city well closest to the site, B-zone contamination is not currently impacting drinking water above health-based levels.

There is no significant ecological risks [sic] *associated with the site.*

VII. Description of Alternatives

goals and Applicable or Relevant and Appropriate Requirements (ARARs) as they apply to the specific alternative.

ARARs

The specific requirements that are applicable or relevant and appropriate for the Brown & Bryant site can be classified into chemical-specific regulations and action-specific regulations. There are no location-specific ARARs at this site. The ARARs at Brown & Bryant are:

> *State Water Resources Control Board, Resolution 68-16 (Anti-degradation policy).*
>
> *Environmental Health Standards for the Management of Hazardous Waste,CCR Title 22, Div. 4.5, Chptr. 15*
>
> > *Article 9, Section 66265.170 - 66265.177 (Containers)*
> > *Article 10, Sections 66265.190 - 66265.200 (Tanks)*
> > *Article 11, Sections 66265.228 (Surface Impoundments, Closure)*
>
> *Underground Injection Control Regulation, 40 CFR Parts 144-147*

Although the A-zone is not a potential drinking water source, water re-injected into the A-zone should be treated to be protective, as required by State Board Resolution 68-16. This resolution offers a narrative description of anti-degradation policy. EPA believes that reinjection of water containing pesticides at the Maximum Contamination Levels (MCLs) under the Safe Drinking Water Act would comply with Resolution 68-16.

Title 22 of the California Code of Regulations (CCR) contains the State's RCRA-equivalent regulations. Although Brown & Bryant did not apply for interim status under RCRA, disposal of waste water into the sump and waste pond at the site constituted RCRA activities. Therefore, Brown & Bryant should have been classified as an interim status facility and the State RCRA *regulations would be applicable. Specifically, the waste pond and the sump area are considered RCRA surface impoundment units and must be closed and monitored pursuant to 22 CCR [Para]66265.228.*

Other RCRA-equivalent requirements for specific treatment units such as tanks, containers, etc. would be applicable, if used. The UV/Oxidation (UltraViolet/Oxidation) system, and the Granulated Activated Carbon (GAC) system if used, would be considered tanks. A variance for the secondary containment requirements in Title 22 CCR [Para]66266, will be invoked when design and placement of the tanks do not pose a substantial hazard to human health and the environment.

Underground Injection Control Regulations under the Safe Drinking Water Act regulate operation of underground injection wells. 40 CFR [Para]144.13 exempts actions under a CERCLA response from the prohibition against reinjection of treated hazardous waste into or above underground sources of drinking water. Therefore, reinjection into the A-zone is permitted. The part of the regulations (40 CFR [Para]144.12) that discuss well construction, operation and abandonment are relevant and appropriate.

Land disposal restrictions (LDRs) in 22 CCR [Para]66268 et seq are applicable in certain circumstances whenever there is placement of soil containing listed waste on the land. At Brown & Bryant, the soil contains listed waste. However, LDRs are not applicable if contamination is consolidated within one area of contiguous contamination. The Brown & Bryant facility is considered one area of contiguous contamination because the dinoseb surface contamination is prevalent all over the site without any specific operational boundaries. Therefore, the surface soil can be consolidated within the facility without triggering LDRs.

All the proposed action alternatives comply with the ARARs.

Remediation Goals

The A-zone groundwater is not a potential drinking water source; nor is the A-zone soil (excluding surface soil) a direct ingestion threat. Clean-up standards for these zones are developed by weighing the cost-effectiveness of cleaning up the zones to levels where they will no longer be a threat to the B-zone groundwater as compared to treating the contamination when it reaches the B-zone groundwater.

The strictest goal for the A-zone groundwater would be under the scenario where most of the contamination is captured in the A-zone and the remaining contamination would not be a threat to the B-zone groundwater. Two vadose models were run, one to model the volatile movement through the A-zone groundwater to the B-zone groundwater, and one to model the movement of dinoseb. A different model was chosen for dinoseb because it is non-volatile and water soluble, and therefore has different transport characteristics (refer to the Remedial Investigation Report). Based on these models, clean-up goals for the A-zone groundwater have been set at ten and one hundred times the respective MCLs in order to keep contamination levels in the B-zone at or below MCLs.

Again, the ultimate goal at the site is to protect the B-zone groundwater in the most cost-effective manner. 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 zone will be determined within the above-stated range that takes into account the cost-effectiveness of meeting the strictest goals in the A-zone groundwater clean-up range. The final remediation levels will be set in the final ROD.

The subsurface soil contaminant levels were also evaluated with respect to protecting the B-zone groundwater. The vadose zone modelling showed that only one contaminant, 1,2-DCP, would pose a risk to the B-zone if a cap is installed. This contaminant could be captured in the A-zone groundwater prior to reaching the B-zone groundwater. EPA determined that it would be more cost-effective to capture the contamination when it reached the A-zone groundwater.

The remediation levels for the surface soil are based on health calculations considering the human ingestion pathway. Dinoseb was the only chemical found in the upper 7 feet in appreciable amounts. Since dinoseb is a systemic toxicant, the clean-up level was developed based on the most sensitive subgroup, young children. The level for dinoseb, 80 milligrams per kilogram, was developed assuming a child ingests 0.2 mg/day of soil over a five-year period using calculations for RCRA no-action (Proposed Subpart S - Federal Register Vol. 55, No. 145, July 1990)."

"Cost
Cost estimates for the six alternatives are presented in Table 1. The costs for the action alternative range from $9,193,000 to $10,923,000."

"IX. Selected Remedy
Alternative #2 is the selected remedy for the first operable unit at the site. The goal of this remedial action is to prevent exposure to soil contaminated above health-based levels and to control the source of contamination to the B-zone groundwater. Based on the information obtained during the remedial investigation and analysis of all the remedial alternatives, EPA believes the selected remedy will be able to achieve this goal. Specifically the selected remedy is as follows:

- *Move contaminated surface soil from the area not included in the RCRA Subtitle C cap to the waste pond and adjacent area where the RCRA Subtitle C cap will be placed. Remaining soil will be tested to confirm that all surface soil containing pesticides above health-based levels has been moved. In addition, the surface soil surrounding the site will be tested to assure that levels of contamination off-site do not exceed health-based levels. If any soil is found exceeding health-based levels, that soil will be consolidated under the cap.*
- *After consolidation of the contaminated soil to the southern portion of the site, the northern and western portion of the site will be regraded and covered with a basic cap, such as asphalt. The purpose of the basic cap is to control storm water runoff. This portion of the site will be considered clean.*
- *Institutional controls will be implemented which will consist of deed restrictions precluding residential use of the site and assuring that the RCRA cap area is maintained.*

- *A RCRA Subtitle C cap will be installed on the waste pond, sump area, dinoseb spill area and adjacent areas. The cap will be designed to prevent exposure and minimize infiltration.*
- *All capped areas will be maintained as appropriate.*
- *The A-zone groundwater will be extracted. After extraction, the water will be treated using UV/Oxidation, and/or possibly, GAC and then reinjected into the A-zone groundwater. Reinjection will be carefully monitored to ensure control of the extracted water. If the water required for reinjection is less than the water produced during treatment, the additional treated water will be discharged to the sewer system.*
- *The extraction/reinjection system will be phased in to allow for optimal design of the system. Reinjection rates will be monitored to prevent build-up of excess head of water that might spread contamination further. The number of extraction/reinjection wells, location of these wells, and extraction and reinjection rates for the initial phase will be establishing during the remedial design. Expansion of the system will be considered after evaluating the effectiveness of the initial system.*
- *After completion of the remedial investigation of the second operable unit and the extraction and treatment system has been in operation long enough to estimate rate of contamination removal, an analysis of the cost-effectiveness of further A-zone treatment versus capturing in the B-zone shall be made.*
- *As required by the State Hazardous Substances Control Act, the period of groundwater monitoring will not be less than thirty years.*

X. Statutory Determinations
Under CERCLA, EPA's primary responsibility at Superfund sites is to undertake remedial actions that achieve adequate protection of human health and the environment. Additionally, the selected remedial action must comply with ARARs established under federal and state environmental laws unless a statutory waiver is justified. The selected remedy also must be cost-effective and utilize permanent solutions and alternative treatment technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that permanently and significantly reduces the volume, toxicity, or mobility of hazardous waste as their principal element. The following sections discuss how the selected remedy meets these statutory requirements and preferences.

Protection of Human Health and the Environment
Threats to human health and the environment include ingestion and contact with contaminated soil and potential exposure to contaminated groundwater. The selected remedy partially addresses the threat of exposure to contaminated groundwater by controlling the greatest source of contamination, the A-zone groundwater. This source of contamination will be extracted and treated to maximum contaminant levels then re-injected into the A-zone groundwater. The A-zone groundwater will be treated to levels that no longer pose a threat to the deeper groundwater; or if the contamination can be more cost-effectively extracted from the B-zone, the A-zone groundwater will be treated to levels that are easily and quickly achieved.

The selected remedy addresses the threat of exposure to contaminated soils by consolidating all contaminated soil in one portion of the site, capping this portion with a high-quality, RCRA Cap, then implementing institutional controls.”

The US EPA ROD document contains a presentation and discussion of comments that various agencies and the public made about the proposed remediation approach. We find that some of the comments made by other agencies and the public concerning deficiencies in the approach were appropriate. Not addressed, however, were the deficiencies and inadequacies inherent in the US EPA OU-1 "selected remedy." It was recognized, even in the mid-1990s when the ROD was issued, that capping of contaminated areas and soils would not provide reliable protection of public health and groundwater for as long as the polluted soils, wastes, and groundwater will be a threat. These issues are discussed in other comments available on the CBA Brown & Bryant Superfund Site website, as well as on G. Fred Lee's website [www.gfredlee.com].

While the US EPA mentioned in the ROD that there would be need to maintain the area cover/cap, as discussed in the second Brown & Bryant site review the US EPA failed to implement adequate provisions for site inspection and repair of the cap/cover. Furthermore, it is inappropriate and misleading for the US EPA to suggest that the site will only need to be monitored for 30 years.