



**Proposed Plan**  
**Brown & Bryant Superfund Site Operable Unit No. 2**  
**City of Arvin, Kern County, California**  
**United States Environmental Protection Agency Region 9**  
**San Francisco, California, June 2007**



This document describes how the U.S. Environmental Protection Agency (EPA) proposes to address groundwater contamination at the former Brown & Bryant Pesticide Reformulation Facility (Facility), now known as the Brown & Bryant Superfund Site (B&B Site). EPA describes the cleanup alternatives considered and the one we prefer. Finally, we ask for your thoughts on this proposal.

## The Proposed Plan at a Glance

**Problem:** During past operations at the Facility, **contaminants\*** were spilled or released onto Site soils. Some of these contaminants have also migrated into the **groundwater** beneath the B&B Site. The Environmental Protection Agency (EPA) has already addressed surface soil contamination in a **Record of Decision (ROD)** dated November 8, 1993. EPA is now proposing a way to clean up remaining contamination.

**Solution:** The EPA proposes to clean up contaminants in the groundwater by extracting and treating the groundwater in the shallower A-zone and allowing **monitored natural attenuation** to reduce the contaminant concentrations in the deeper B-zone (see Figure 3). In addition, the EPA proposes to relocate the Arvin City Well No. 1 (CW-1) to eliminate any possible risk of community residents drinking potentially contaminated groundwater.

**Comments:** You can provide your comments on this **Proposed Plan** either verbally during our public meeting on June 21, 2007, or in writing via letter, fax, or e-mail (see page 16 for contact information). The EPA will consider your comments as we develop our final decision on how to clean up the B&B Site, and we will respond to all comments in a final written document.

*This Proposed Plan is issued pursuant to the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA), to facilitate community involvement in the remedy selection for the Brown & Bryant Superfund Site.*

\*All words in **bold** are defined in the Glossary on Page 14.

### Public Comment Period

The public comment period runs for 30 days from June 21, 2007 through July 21, 2007.

### Community Meeting

A public meeting will be held on Thursday, June 21, 2007 at 7:00 pm at the Arvin Branch of the Kern County Library. The purpose of this meeting is to give the community the opportunity to ask questions and provide comment regarding the proposed cleanup program. In addition to the public meeting, the public is invited to send their comments via letters, faxes, and e-mails to the EPA.

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## About the Proposed Plan

EPA is seeking public comments on this Proposed Plan to address groundwater contamination at the B&B Site in Arvin, California. The EPA has prepared this Proposed Plan to: (1) inform the community about the history and environmental findings at the B&B Site; (2) describe the cleanup options and EPA's preferred alternative; (3) solicit public comments on EPA's **cleanup** proposal; and (4) describe how the public can become involved.

EPA is issuing the Proposed Plan as part of its public participation responsibilities. This Proposed Plan summarizes information that can be found in greater detail in the Remedial Investigation/Feasibility Study (RI/FS) report and other documents contained in the Administrative Record file for this Site. The Administrative Record file also includes the applicable, or relevant and appropriate requirements specified by the State of California for this project. The EPA and the State of California encourage the public to review these documents to gain a more comprehensive understanding of the B&B Site, including the investigations and other cleanup activities that have been conducted at the Site. The RI/FS document is available for public review at the information repositories listed on page 16.

This Proposed Plan summarizes the cleanup alternatives that were considered by EPA in the RI/FS, and it describes in detail the alternatives that are available to address the Operable Unit No. 2 (OU-2), contamination in the B-zone groundwater B&B Site. The OU-2 consists of impacted subsurface soil from the base of the first water-bearing unit (A-zone groundwater) located approximately 85 below ground surface (bgs) to the second water-bearing unit (B-zone groundwater) at approximately 140 feet bgs, and the B-zone groundwater located below 140 feet bgs. The Operable Unit No. 1 (OU-1) consisted of the surface soil and the subsurface soil to 65 feet (A-zone soils), and the first saturated interval located approximately 65 to 85 bgs (A-zone groundwater). Remedial activities addressing OU-1 soil contamination were completed by EPA in 2000, as discussed in the next section.

The descriptions of alternatives include EPA's preferred remedial (cleanup) alternatives - that is, the cleanup methods that were found to be the most effective, based on a set of established criteria (*see*

*Figure 5* on page 10 for a listing of these criteria). EPA's primary objective for the preferred alternatives is to protect human health and the environment. The alternatives described in this Proposed Plan are based on those presented in the FS.

EPA will select the final cleanup method (the remedy) for the B&B Site after considering the community's input provided during the 30-day comment period. EPA encourages you to read this Proposed Plan and other related environmental studies for the B&B Site. Public input on all alternatives is an important part of the remedy selection process. Your input can influence EPA's decision.

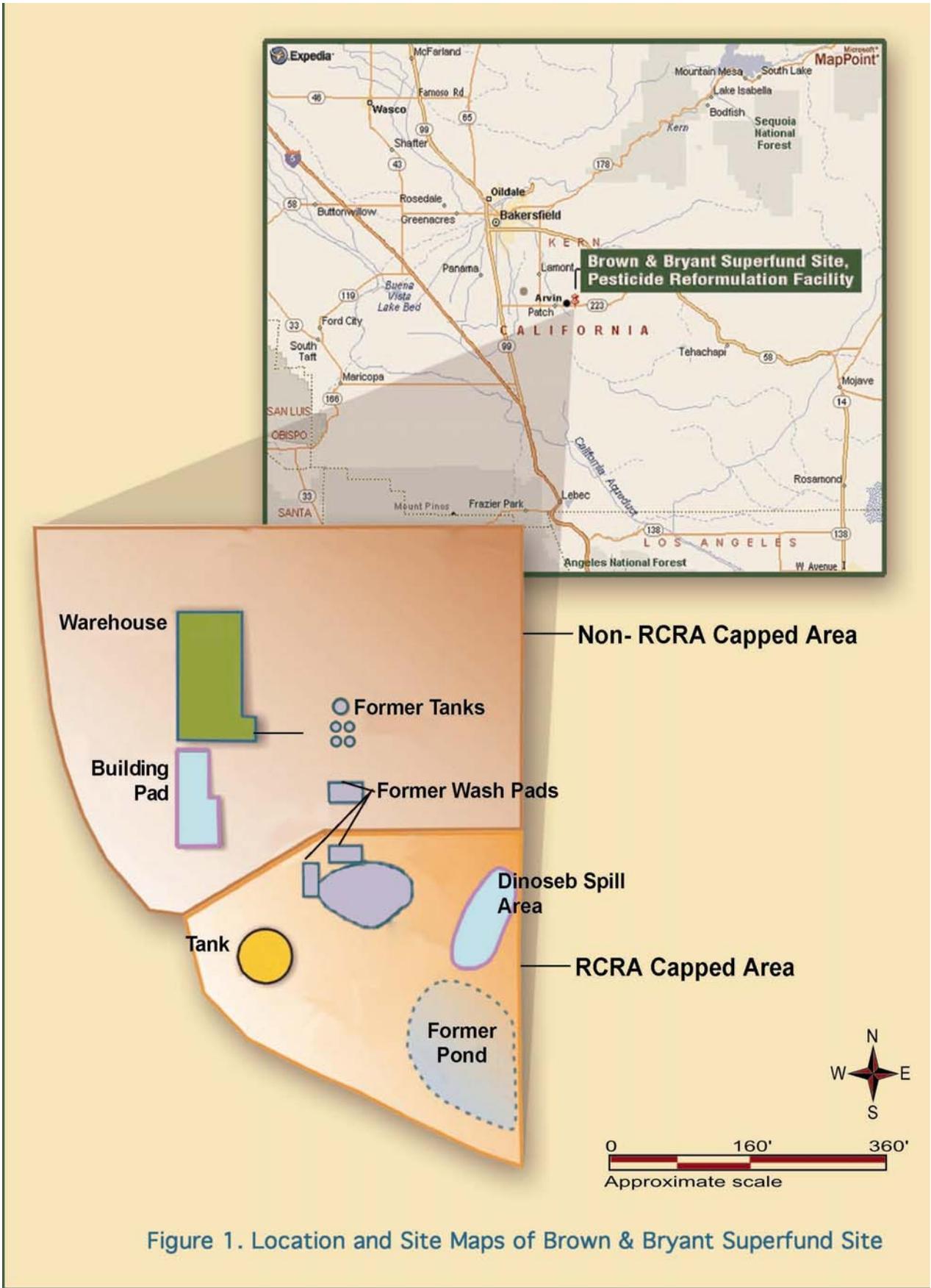
After considering public comments, EPA will make a final selection of the remedy to be implemented at the B&B Site in accordance with the National Contingency Plan (NCP). EPA will then present the selected remedy in a document called the ROD. The ROD will include a Responsiveness Summary, which will present all comments received on the Proposed Plan along with EPA's responses to those comments.

## Site Background

The content of this Proposed Plan is based on information presented in the RI/FS report and related documents (Panacea, Inc., 2005). The B&B Site was a pesticide reformulator and custom applicator facility that operated from 1960 to 1989. The Site is approximately five acres in area and is located at 600 South Derby Street, Arvin, Kern County, California. (*See Figure 1. Site Location and Site Map*)

Contamination of soil and groundwater resulted primarily from poor facility operations and maintenance, spills, and leaks from a surface pond and sumps. In 1981, the facility was licensed under the *Resource Conservation and Recovery Act* (RCRA) as a hazardous waste transporter. The B&B Site has been the subject of several investigations dating from 1983 to the present. Previous investigations focused on OU-1, which includes soil to 65 feet (A-zone soils) and the A-zone groundwater.

In 1983, investigations at the B&B Site began in compliance with the requirements of the NCP and

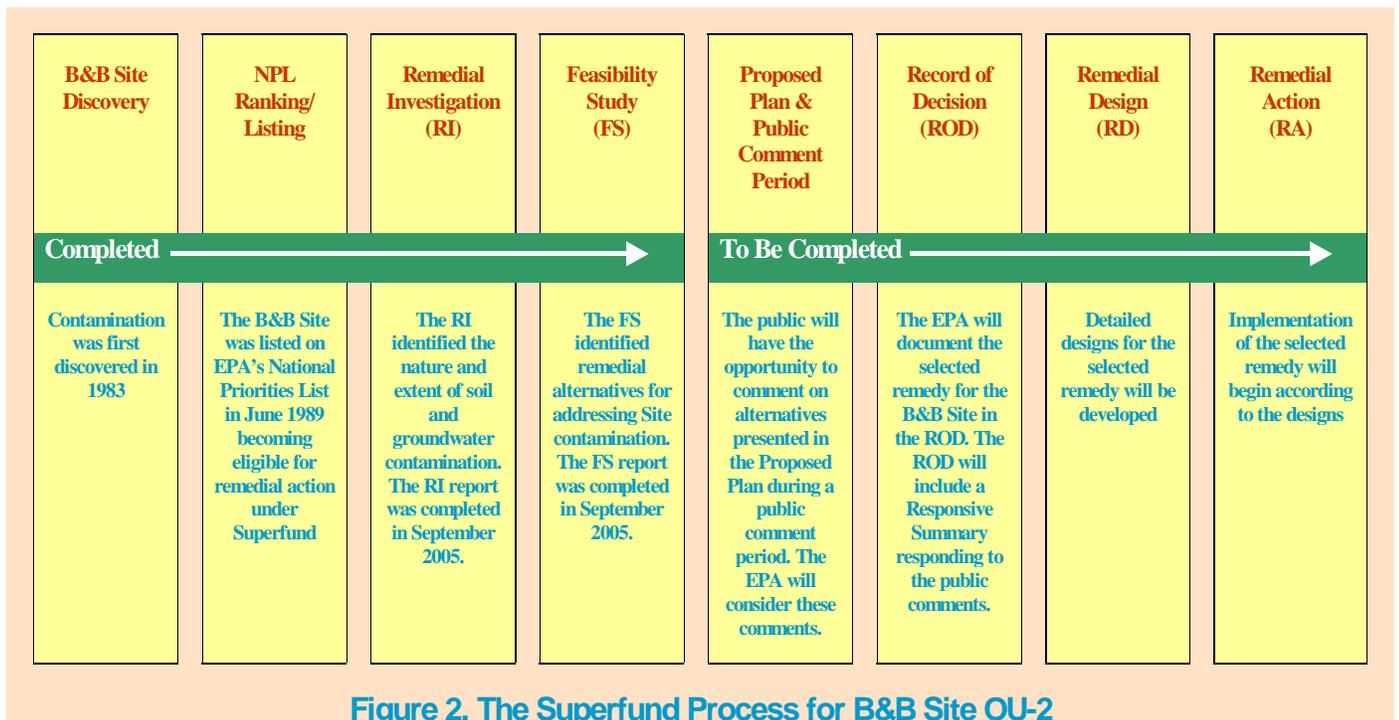


the State of California. The initial investigations of the B&B Site OU-1 included soil and groundwater sampling and analysis. Sampling results from surface soils identified Dinoseb as a **Contaminant of Concern (COC)**. Dinoseb was detected at concentrations exceeding 7,000,000 µg/kg (parts per billion) of soil. The peak concentration of dinoseb impact occurred in a former spill area along the east fence-line and beneath a former pond and sump. The impacted surface soil was removed and an asphalt cap was installed over the entire B&B Site. The southern portion of the cap is an engineered RCRA cap. This cap limits or eliminates surface water infiltration. These actions included the off-site disposal of contaminated soil. In 1989, the B&B Site was listed on the National Priorities List (NPL) of Superfund Sites. In 1990, EPA conducted an emergency response site assessment and began the RI and FS for OU-1.

The outcome of the OU-1 RI and FS was a Record of Decision (ROD) that was signed on November 8, 1993, by the EPA Deputy Regional Administrator. The COCs identified for OU-1 were chloroform, 1,2-Dibromo-3-chloropropane, 1,2-Dichloropropane, 1,3-Dichloropropane, Dinoseb, Ethylene Dibromide and 1,2,3-Trichloropropane. The COC characteristics are described in Table 2

(page 9). COC-impacted soil and asphalt was removed to the former waste pond area in the southeast corner of the B&B Site. Concrete that was not contiguous with the warehouse building was pressure washed and removed and disposed of off site. The concrete slab in the warehouse was pressure washed. Plastic liner material used under soil stockpiles was washed and disposed of off site. A 1,200-gallon underground storage tank was excavated and removed from the Site. A 200-foot long rail spur, as well as storage containers and drums, were washed and removed from the Site. Liquids from containers and wash water were pumped into the existing UN-32 tank for subsequent treatment and discharge. A RCRA cap consisting of a geosynthetic clay liner and protective asphalt covering was constructed in the southeastern part of the site covering an area of approximately 60,000 square feet. A non-RCRA cap consisting of a 3-inch bituminous course on a 6-inch compacted subgrade was constructed on all site areas that were not covered by the RCRA cap. A new 6-foot high chain link fence was constructed around the RCRA-capped area.

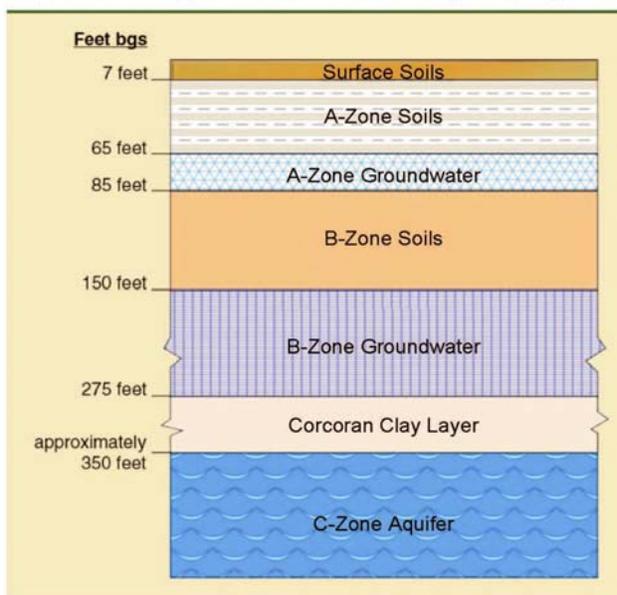
Studies and cleanup of contamination at the B&B Site is following the federal Superfund process (see Figure 2).



## Site Characteristics

The EPA defined the soil and groundwater beneath the A-zone and offsite (down gradient) of the B&B Site as OU-2 (see Figure 3). The RI/FS for OU-2 began in 2000 and consisted of additional investigation of impacted soil and groundwater beneath and south of the B&B Site. The OU-2 RI/FS was completed in September 2005 and includes a RI report, a FS report, a Fate and Transport Modeling Report, a Human Health Risk Assessment, and Ecological Risk Assessment.

**Figure 3. Designation of the Soil Layering System**



The B&B Site OU-2 includes the water-bearing zone (the B-zone) below the A-zone. This B-zone water is found beneath the former B&B Site and extends south-southwest. The B-zone **aquifer** is monitored between the depth intervals of approximately 140 and 180 feet bgs. A clay layer, known as the Corcoran Clay, is present beneath the B-zone. Below this clay is a sandy layer that forms a confined drinking water aquifer (see Figure 3), which is used by the City of Arvin.

The subsurface investigations of OU-2 also included sampling groundwater in the A-zone, approximately 75 feet bgs. The A-zone consists of **perched groundwater**, with a **saturated zone** up to about 10 feet thick, overlying a silty clay zone a few feet thick. The A-zone groundwater is not continuous, extending only several hundred feet east, south, and west of the B&B Site. Wells

installed in this zone pumped only about 0.25 gallons per minute (gpm). Because of these subsurface characteristics, it is difficult to extract groundwater from the A-zone. The A-zone groundwater is impacted by COCs.

The B-zone aquifer comprises a series of water bearing units from approximately 150 to 275 feet bgs. However, the primary B-zone groundwater monitoring well completion zone is between 140 and 180 feet bgs. Flow direction in this zone is generally to the southwest but varies locally to the northeast, north and west. Because of these characteristics, groundwater can be pumped at a rate of 7 gpm for an extended period. The B-zone groundwater is not a current human exposure route, as it is not being used as a drinking water source. However, it is classified by the Central Valley Regional Water Quality Control Board (CVRWQCB) as a potential drinking water source. Percolation of impacted groundwater from the A-zone has impacted the B-zone aquifer, and is expected to continue under the current Site conditions.

The C-zone groundwater is not impacted, and is not expected to be impacted through percolation because the clay layer beneath the B-zone restricts the migration of B-zone impacted groundwater to the C-zone. However, the B-zone impacted groundwater may migrate to C-zone through the annular space of any well that has not been constructed to seal off the B-zone shallow groundwater. Figure 4 depicts the estimated extent of Dinoseb, Dibromochloropropane and 1,2-DCA concentrations above the drinking water maximum contaminant levels (MCLs) in the A-zone groundwater and in the B-zone aquifer.

### Summary of Site Risks

As part of the RI/FS, the EPA conducted a Human Health and Ecological Risk Assessment to determine the current and future effects of COCs on human health. The A-zone perched groundwater is not an aquifer or potential drinking water source due to its low yield. The B-zone groundwater aquifer is not being used as a drinking water source. However, it is classified by the CVRWQCB as a potential drinking water source. A city water production well, CW-1, in the C-zone aquifer is located 1,300 feet southwest of the Site and is at risk of being affected by contaminants

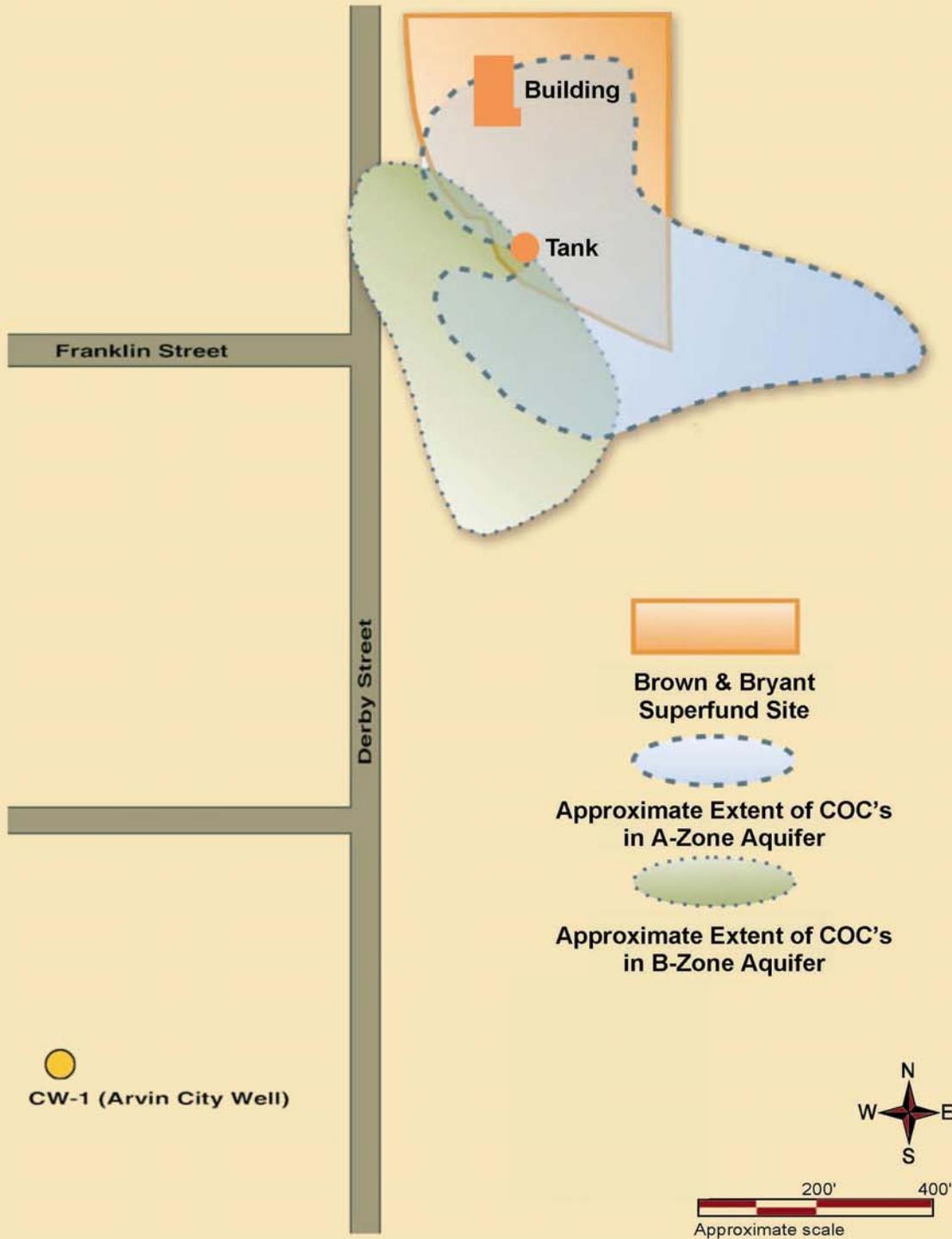


Figure 4. Extent of COC's in A-Zone and B-Zone Aquifers

from the B&B Site. A preliminary site survey and an environmental evaluation of ecological risks were conducted as part of OU-2 studies. The area around the B&B Site is utilized for mixed residential and agricultural purposes.

### Human Health Risks

As part of the RI/FS, the EPA conducted a Human Health Risk Assessment to determine the current and future effects of COCs on human health. The risk assessment focused on potential health effects for five **receptors** under both current and future site conditions. These are:

- Onsite maintenance worker
- Onsite commercial/industrial worker
- Offsite residents (adult)
- Offsite resident (child)
- Offsite commercial/industrial worker

Under the current exposure scenario, the carcinogenic risks conservatively assessed based on modeled exposure point concentrations for all receptors, except the on-site commercial industrial worker, are within the acceptable standard of  $10^{-4}$  (1 in 10,000) to  $10^{-6}$  (1 in 1,000,000) risk management goal stipulated by EPA. The  $7.5 \times 10^{-6}$  risk for the onsite commercial industrial worker slightly exceeds the risk level of 1 in 1,000,000 typically applied by the State of California if the cap is disturbed. At the existing (metal warehouse) or future structures located on-site, the projected risks to this receptor are associated with potential indoor air exposures to contaminants originating from the underlying soils and groundwater. The 2006 soil vapor sampling results show that the projected risks are below the 1 in 1,000,000 level typically employed by the State of California for the management of risks under uncontrolled land use conditions. The difference between the risks estimated by modeled concentrations and soil vapor sampling are insignificant.

This **pathway** becomes more prevalent in the future exposure scenario when the A-zone contaminants are projected to migrate offsite. The emissions from these projected offsite sources are responsible for **long-term receptors** exceeding the lowest acceptable risk and in select cases the EPA target range of  $10^{-4}$  (1 in 10,000) to  $10^{-6}$  (1 in 1,000,000). The only receptor shown to be below

the lowest acceptable level is the onsite maintenance worker. This risk assessment has shown, in a conservative manner using EPA and California EPA guidance, that the COCs may pose a hazard to potential on-site workers if not controlled.

The COC concentrations in the B-zone groundwater, a potential drinking water source, are currently above the drinking water MCLs. In addition, the Arvin City well CW-1, a current source of drinking water and point of exposure, is at risk of being affected by the COCs from the B&B Site. It is EPA's current judgment that the Preferred Alternative identified in this Proposed Plan, or other measures considered in the Proposed Plan, are necessary to protect the public health or welfare from actual or threatened release of hazardous substances into the environment.

### Ecological Risks

The 1991 preliminary site survey and an environmental evaluation of ecological risks conducted to quantify the potential risks to the environment as part of OU-2 studies in 2003 indicated that the potential for ecological impacts from the B&B Site COCs was insignificant. The finding of the ecological risk evaluation indicates that there were no potential ecological receptors at or adjacent to the B&B Site. It was determined that they are not expected to occur based on the disturbed nature of the Site, with limited amounts of natural habitats where the identified receptors would be found. Because the identified ecological receptors were not located at or adjacent to the B&B Site, the determination was made that there was no need to conduct an extensive ecological risk assessment.

### **Remedial Action Objectives**

The Remedial Action Objectives (RAOs) for the B&B Site OU-2 are to:

- Remove or control groundwater contamination source from the A-zone to reduce further contamination of B-zone groundwater.
- Restore the B-zone groundwater to drinking water standards within a reasonable time frame.

- Prevent potential exposure to contaminated groundwater.

The primary concern for B&B Site OU-2 is the quality of the groundwater in the B-zone aquifer and in the city well and any other wells that may be installed in the vicinity of CW-1 in the future, and thus to limit potential human exposure to the COCs. Although, A-zone groundwater is a part of the OU-1, it is carried over and considered as a part of the OU-2 remedial strategy because the COCs contaminated A-zone groundwater percolation to the B-zone aquifer is continuing and is expected to continue under current Site conditions. This proposed action would protect human health and the environment from conditions in subsurface that have been identified in the RI. The groundwater contamination source will be removed by reducing the A-zone groundwater COC concentrations to their cleanup goals set at ten and one hundred times their respective MCLs in order to keep contamination levels in the B-Zone at or below MCLs. The MCLs and cleanup goals for A-zone groundwater, which were specified in the November 1993 OU-1 ROD, are presented in Table 1. The cleanup levels for COCs in the B-zone groundwater are federal or state MCLs and are presented in Table 2 (Page 9).

Potential exposure to impacted groundwater in the B-zone will be prevented by decommissioning and relocating the Arvin City well CW-1, and implementing appropriate institutional controls consisting of deed and zoning restrictions. These actions, along with supporting information, are described in this Proposed Plan.

## Remedial Alternatives Summary

The B&B Site OU-2 Feasibility Study proposed the following remedial alternatives (along with relocating Arvin City Well CW-1):

- Alternative 1—No Action.
- Alternative 2—Monitored natural attenuation.
- Alternative 3—Source reduction in the A-zone and no action in the B-zone.
- Alternative 4a—Dual-phase extraction and treatment of soil vapor and groundwater in the A-zone and no action in the B-zone.
- Alternative 4b—In-situ bio-treatment and bio-augmentation in the A-zone and no action in

the B-zone.

- Alternative 5—No action in the A-zone and groundwater extraction and treatment in the B-zone.
- Alternative 6—Groundwater extraction and treatment in the A-zone and the B-zone.

## Evaluation of Alternatives

Nine criteria (*see Figure 5*) are used to evaluate the different remedial alternatives individually against each other in order to select a remedy. This section of the Proposed Plan profiles the relative performance of each alternative against the nine criteria, noting how it compares to other alternatives under consideration. The Most Likely Total Costs for the alternatives assume a 10-year operating life and 10 years of monitoring at the site, and are based on subjective identification of variables. Operation and Maintenance Costs are included as present value costs at a 7-percent discount rate. A range of costs around this number would reflect the favorable and unfavorable outcome when implementing the remedial action.

An evaluation of remedial alternatives for the B&B OU-2 is summarized (*see Table 3*) and discussed below with respect to achieving the remedial action objectives.

### Decommission Arvin City Well CW-1 and Relocate in Non-impacted Area

This action will occur along with any and all other remedial alternatives selected. It consists of properly abandoning the existing CW-1 and installing it in an alternative location at a suitable distance from the known B&B Site **plume**.

- *Capital and Periodic Costs: \$985,000*
- *Annual Operation and Maintenance (O&M) Costs: None*
- *Most Likely Total Costs: \$985,000*

### Alternative 1 – No Action

In this alternative, there is no planned remedial action in the B-zone (OU-2) and the site remains in its present condition. The subsurface conditions will be monitored periodically to evaluate the groundwater concentrations of the COCs, and Site Caps inspection and maintenance. This alternative

**Table 1. Brown & Bryant Site A-zone Groundwater Cleanup Goals**

Contaminant of Concern	Maximum Contaminant Level (µg/L) <sup>1</sup>	A-zone Groundwater Cleanup Goal (µg/L)
Chloroform	80	800 – 8,000
1,2-Dibromo-3-chloropropane (DBCP)	0.2	20 - 20
1,2-Dichloropropane (1,2-DCP)	5	50 - 500
1,3-Dichloropropane (1,3-DCP)	0.5	5 - 50
Dinoseb	7	70 - 700
Ethylene Dibromide (EDB)	0.05	0.5 - 5
1,2,3-Trichloropropane (1,2,3-TCP)	40 <sup>2</sup>	400 – 4,000

<sup>1</sup> Microgram per liter

<sup>2</sup> Chronic (lifetime) Health Advisory

**Table 2. Contaminants of Concern and Cleanup Goals for B-zone Groundwater**

Contaminant of Concern	Chemical Characteristic and Use at B&B Site	Federal MCL <sup>1</sup> (µg/L)	State MCL <sup>2</sup> (µg/L)
Chloroform	Highly reactive, non-flammable, heavy, very volatile, sweet tasting liquid with a characteristic odor. Used as a cleaning agent, fumigant, and insecticide	80 <sup>3</sup>	80 <sup>3</sup>
1,2-Dibromo-3-chloropropane (DBCP)	Dibromochloropropane is a dense yellow organic liquid with a pungent odor. It is used primarily as an unclassified nematocide for soil fumigation of cucumbers, summer squash, cabbage, cauliflower carrots, snap beans, okra, aster Shasta, daisy, lawn grasses, and ornamental shrubs.	0.2	0.2
1,2-Dichloropropane (1,2-DCP)	1,2-DCP is colorless organic liquid with chloroform like odor. The greatest use of 1,2-DCP is in making other organic chemicals. It is used as a soil fumigant for nematodes and as an insecticide for stored grain	5	5
1,3 Dichloropropane (1,3-DCP)	1,3-DCP is similar to 1,2-DCP and is mainly used to kill nematodes. It is often sprayed undiluted directly on the soils of vegetable and tobacco crops.	None	0.5
Dinoseb	Dinoseb is an organic solid –yellowish crystal with a pungent odor. Its greatest use is as a contact herbicide for post-emergence weed control in cereals, under sown cereals, seedling Lucerne and peas. Dinoseb is also used as a corn yield enhancer and as insecticide and miticide.	7	7
Ethylene Dibromide (EDB)	EDB is a colorless, heavy organic liquid with mildly sweet chloroform like odor. EDB is used as a pesticide for grains and fruit.	0.05	0.05
1,2,3-Trichloropropane (1,2,3-TCP)	1,2,3-TCP is a colorless, heavy liquid with a sweet but strong odor. It evaporates very quickly and small amounts dissolve in water. It is mainly used to make other chemicals.	40 <sup>4</sup>	None

<sup>1</sup> Federal standards, current U.S. Environmental Protection Agency (EPA) drinking water standards

<sup>2</sup> California Code of Regulations, Title 22, Chapter 15 (Section 64444) & 15.5 (Section 64533), February 2007

<sup>3</sup> Total Trihalomethanes (sum of bromodichloromethane, dibromochloromethane, bromoform and chloroform), EPA MCL effective 01/01/04, Cal/EPA MCL effective 6/17/06

<sup>4</sup> EPA Chronic (lifetime) Health Advisory Level

**Figure 5. Remedy Selection: Nine Criteria for Evaluating Remedial Alternatives**

<p><b>Threshold Criteria</b></p> <p><i>These criteria are requirements that each alternative must meet to be eligible for selection.</i></p>	<p><b>1 Overall Protection of Human Health and the Environment</b> How risks to the public and the environment are eliminated, reduced, or controlled. </p> <p><b>2 Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)</b> Federal and state environmental statutes met and/or grounds for waiver provided. </p>
<p><b>Primary Balancing Criteria</b></p> <p><i>These criteria are used to weigh major trade-offs among alternatives.</i></p>	<p><b>3 Long-Term Effectiveness and Permanence</b> Maintain reliable protection of human health and the environment over time, once cleanup goals are met. </p> <p><b>4 Implementability</b> Technical and administrative feasibility of a remedy, including the availability of materials and services needed to carry it out. </p> <p><b>5 Short-Term Effectiveness</b> Protection of human health and the environment during construction and implementation period. </p> <p><b>6 Reduction of Toxicity, Mobility, and Volume (TMV) Through Treatment</b> Ability of a remedy to reduce the toxicity, mobility, and volume of hazardous contaminants present at the Site. </p> <p><b>7 Cost</b> Estimated capital, operation, and maintenance costs of each alternative. </p>
<p><b>Modifying Criteria</b></p> <p><i>These criteria are considered after public comment is received on the Proposed Plan. They are taken into account in the final remedy selection process.</i></p>	<p><b>8 State Acceptance</b> State concurs with, opposes, or has no comment on the preferred alternative. </p> <p><b>9 Community Acceptance</b> Community concerns addressed; community preferences considered. </p>

**FINAL REMEDY**

**Table 3. Remedial Alternatives for B&B Site OU-2**

<b>Evaluation Criteria</b>	<b>Alternative 1, No Action</b>	<b>Alternative 2, Monitored Natural Attenuation</b>	<b>Alternative 3, Source Reduction in the A-zone and No Action in the B-zone</b>	<b>Alternative 4a, Dual-phase Extraction and Treatment of Vapor and Groundwater in the A-zone and No Action in the B-zone</b>	<b>Alternative 4b, In-situ Biotreatment and Bio-augmentation in the A-zone and No Action in the B-zone</b>	<b>Alternative 5, No Action in the A-zone and Groundwater Extraction and Treatment in the B-zone</b>	<b>Alternative 6, Groundwater Extraction and Treatment in the A-zone and the B-zone</b>
<p>● = Fully meets criteria                      ▲ = Partially meets criteria                      ■ = Does not meet criteria</p>							
<b>Overall Protectiveness</b>	■	▲	●	▲	■	▲	●
<b>Compliance with State and Federal Requirements</b>	■	▲	●	▲	▲	▲	●
<b>Long-term Effectiveness</b>	■	●	●	▲	▲	▲	●
<b>Implementability</b>	n/a	●	●	■	▲	▲	▲
<b>Short-term Effectiveness</b>	n/a	■	▲	■	■	■	■
<b>Reduction of Toxicity, Mobility or Volume by Treatment</b>	■	▲	▲	▲	▲	▲	●
<b>Most Likely Total Cost</b>	\$3,324,000*	\$5,222,000*	\$15,585,000*	\$48,007,000*	\$18,095,000*	\$38,031,000*	\$70,489,000*
<b>State Agency Acceptance</b>	The California Department of Toxic Substances Control has concurred with the U.S. Environmental Protection Agency's preferred alternatives. The California Central Valley Regional Water Quality Control Board has been consulted regarding the B&B remedial alternatives.						
<b>Community Acceptance</b>	Community acceptance of the preferred alternatives will be evaluated after the public comment period.						

\* Since decommissioning and relocation of the Arvin City Well CW-1 will occur along with any and all other alternative selected, the most likely cost of the selected remedy includes \$985,000 for the City Well decommissioning and relocation.

is a baseline condition against which other alternatives can be compared. The consideration of this alternative is required by federal regulation. It is expected that under this alternative a comprehensive site review would be conducted every 5 years (Figure 5) as required by the NCP.

- *Capital and Periodic Costs: None*
- *City Well Decommissioning & Relocation Capital Costs: \$985,000*
- *Annual O&M Costs: \$333,000*
- *Most Likely Total Costs: \$3,324,000*

**Alternative 2 – Monitored Natural Attenuation**

Monitored natural attenuation refers to the reliance on natural attenuation processes (physical, chemical or biological) to achieve site-

specific remediation objectives within a reasonable time frame. This alternative is to monitor the groundwater to observe the progress of natural attenuation resulting from relatively fast B-zone aquifer flow and transport in mitigating COCs concentrations based on the site fate and transport modeling. This periodic groundwater monitoring is a continuation of the on going monitoring that has been part of site work since 1987. The monitoring would observe the natural reduction of the COC concentrations in the groundwater.

This alternative would also include additional institutional controls to address potential health risks. These controls may include deed and zoning (short-term or long term), permit requirements, and public education. This alternative will result in the achievement of compliance with the RAO of limiting potential

human exposure to COCs through the natural reduction in the COC concentrations in groundwater.

If one of Alternatives 3 through 6 is selected, it is expected that some or all of the features of Alternative 2 would be incorporated into the selected alternative. Therefore, the cost estimate for this alternative is included in the cost estimate for Alternatives 3 through 6.

- *Capital and Periodic Costs: \$550,000*
- *City Well Decommissioning & Relocation Capital Costs: \$985,000*
- *Annual O&M Costs: \$525,000*
- *Most Likely Total Costs: \$5,222,000*

### **Alternative 3 – Source Reduction in the A-zone and No Action in the B-zone**

In this alternative, the groundwater of the A-zone that feeds contaminants to the B-zone is remediated by extraction and treatment. The treated groundwater is then discharged to the City sewer system. For this alternative, up to four large diameter sump wells are installed at selected locations to intercept the A-zone contaminated groundwater. Using this approach there is no disturbance to the onsite asphalt caps. In order to overcome the low A-zone groundwater yield in traditional extraction wells, large diameter sump wells will be constructed by drilling 8-foot diameter holes at the appropriate locations to a depth of 75 feet or to the base of the A-zone. It is expected that an average of 15 to 150 gallons per day of water may be extracted from the A-zone using this approach.

An ultra violet light/oxidation (UV/Oxidation) system will be used for treatment of the extracted water. The treatment plant will be constructed onsite for this purpose. This treatment system breaks down the COCs into harmless components, thus reducing human exposure to the COCs. Alternatively, a service contract might be utilized for offsite treatment and disposal of the water if such an approach is found to be cost advantageous. The cost estimate for this alternative also includes cost estimate for Alternative 2.

- *Capital and Periodic Costs: \$2,660,000*
- *City Well Decommissioning &*

- *Relocation Capital Costs: \$985,000*
- *Annual O&M Costs: \$1,700,000*
- *Most Likely Total Costs: \$15,585,000*

### **Alternative 4a – Dual-phase Extraction and Treatment of Vapor and Groundwater in the A-zone and No Action in the B-zone**

In this alternative, a total of 80 wells will be installed to serve as extraction and service wells in the A-zone vadose and saturated zones. Details of technology utilized will be dependent on whether a site-specific design is utilized to extract water and vapor under vacuum or one of the proprietary and licensed technologies is purchased for site implementation. For effective utilization of this alternative, many of the wells will need to be installed onsite requiring penetration through the RCRA cap. This will require a modification to the OU-1 remedy for implementation of this alternative. Water and soil vapor will be extracted in one stream to the treatment system where the phases will be separated for treatment. It is expected that the vapor phase will be treated using activated carbon and the liquid phase will be treated by UV/Oxidation. Field pilot testing would be necessary to verify the effectiveness of multi-phase extraction and to provide information for design. The remedial action objective for A-zone groundwater (10 times the contaminant MCLs) may be used as a guide for evaluating the progress of the remedial action. This alternative will remove the COCs from the A-zone resulting in less contamination in the B-zone and thus will limit the potential for human exposure to the COCs.

- *Capital and Periodic Costs: \$15,135,000*
- *City Well Decommissioning & Relocation Capital Costs: \$985,000*
- *Annual O&M Costs: \$4,540,000*
- *Most Likely Total Costs: \$48,007,000*

### **Alternative 4b – In-situ Bio-treatment and Bio-augmentation in the A-zone and No Action in the B-zone**

In this alternative, a total of 15 wells are planned for obtaining access to the treatment zones within the A-zone. It is expected that different treatment processes will be required in site areas dependent

on the nature of contamination assessed in the treatment zones. In zones where the chlorinated propanes are the driving risk, a cometabolic/aerobic treatment processes will be used. However, in zones where dinoseb is the driving risk, an anaerobic treatment processes will be used. An alternative scheme would be to treat the zones sequentially by implementing a cometabolic/aerobic treatment process at the start and then after treatment of the chlorinated propanes has been achieved, transition into anaerobic treatment for dinoseb. For effective utilization of this alternative, some of the wells installed onsite may require penetration through the RCRA cap. Additional field data are needed to ensure use of the appropriate in-situ treatment for effective implementation of this alternative. In addition to site specific geochemical and hydrogeologic information, it is expected that bench-scale laboratory tests would be required for preparing the design. In addition, it may be appropriate to identify field plots for pilot testing to evaluate the effectiveness of the remedial scheme. The costs below do not include pre-design investigations and tests needed to implement the remedy. 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 from A-zone contamination. The remedial action objective for A-zone groundwater (10 times the contaminant MCLs) may be used as a guide for evaluating the progress of the remedial action. As in Alternative 4a, this alternative will reduce the A-zone contamination and result in lower potential exposure to COCs in the B-zone.

- *Capital and Periodic Costs: \$2,290,000*
- *City Well Decommissioning & Relocation Capital Costs: \$985,000*
- *Annual O&M Costs: \$2,110,000*
- *Most Likely Total Costs: \$18,095,000*

**Alternative 5 – No Action in the A-zone and Groundwater Extraction and Treatment in the B-zone**

In this alternative, it is proposed to install a total of 75 wells to the B-zone in a conventional pump

and treat approach. It is expected that this can be accomplished by wells situated offsite, as penetration of the A-zone confining clay layer would not be recommended. Accordingly, this alternative would retain the OU-1 remedies and controls. It would not require any disturbance to the onsite caps. The pumped water will be transported to the UV/Oxidation treatment system that may be located in the non-RCRA cap portion of the site or at a convenient offsite location. The treated groundwater will be discharged to the City sewer. 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 continue until the OU-2 RAO of limiting the B-zone groundwater to COC MCL levels is achieved and there is no further threat to the B-zone from A-zone contamination.

- *Capital and Periodic Costs: \$8,460,000*
- *City Well Decommissioning & Relocation Capital Costs: \$985,000*
- *Annual O&M Costs: \$4,070,000*
- *Most Likely Total Costs: \$38,031,000*

**Alternative 6 – Groundwater Extraction and Treatment in the A-zone and B-zone**

This alternative is combined Alternative 4a and 5 approaches where remediation is planned and implemented in both the A-zone and the B-zone. All of the factors that are described for these alternatives above would be applicable in this alternative. Since both A-zone and B-zone treatment is planned, it may be possible to gain efficiencies by combining some of the installation wells to extract from both A- and B-zones. 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 MCLs is achieved and there is no further threat to the B-zone from A-zone contamination. The remedial action objective for A-zone groundwater (10 times the contaminant MCLs) may be used as a guide for evaluating the progress of the remedial action within that zone.

- *Capital and Periodic Costs: \$22,165,000*

- *City Well Decommissioning & Relocation Capital Costs: \$985,000*
- *Annual O&M Costs: \$6,740,000*
- *Most Likely Total Costs: \$70,489,000*

## EPA's Preferred Alternative

EPA prefers the implementation of a combination of alternatives 2 and 3, along with the relocation of the Arvin city well CW-1 to achieve the long-term goal of preventing current and future exposure to the public from contaminated groundwater. This alternative consists of removing the potential risk pathway of the B-zone contaminated groundwater and Arvin city well CW-1, utilizing the process of natural attenuation to remediate the B-Zone aquifer, and reducing the potential on-going source of contamination in the A-Zone aquifer. This combination of alternatives has the advantage of immediately eliminating the potential risk of drinking contaminated water (moving CW-1), active source-removal (removing contaminants from the A-Zone) and cost effectiveness (achieving contaminant reduction through monitored natural attenuation in the B-Zone).

- **Estimated Capital Cost:**  
\$3,645,000
- **Annual Operations and Maintenance Cost:**  
\$1,700,000
- **Most Likely Total Cost (10 Year):** \$15,585,000

## Community Participation and Public Support of the Cleanup

A public meeting will be held on Thursday, June 21, 2007 at 7:00 pm at the Arvin Branch of the Kern Country Library. The purpose of this meeting is to give the community the opportunity to ask questions and provide comment regarding the proposed cleanup. In addition to the public meeting, the public is invited to send comments via letters, faxes and e-mails to the EPA.

The EPA will accept public comment for thirty (30) days following the release of this Proposed

Plan. Persons providing comments should be aware that this public comment period is an opportunity to comment not only on this proposed action, but also on all the alternatives that were considered by the agencies.

## Please Comment

The public comment period runs from June 21, 2007 through July 21, 2007.

For more information, please contact:

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## Glossary of Terms

### Aquifer:

Permeable layers of underground rock, sand or gravel that hold or transmit groundwater below the water table.

### Cleanup:

Action taken to address a release of contaminants that could affect human health and/or the environment. The term "cleanup" is sometimes used interchangeably with the term "remedial action".

### Comprehensive Environmental Response, Compensation and Liability Act (CERCLA):

A federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA). The Act created a

trust fund, known as Superfund, to investigate and clean up abandoned or uncontrolled hazardous waste sites.

**Carcinogenic:**

Causing cancer or contributing to the causation of cancer.

**Contaminant of Concern (COC):**

Any chemical contaminant that may potentially cause harm to human health or the environment.

**Cometabolic:**

Biological activities taking place in a particular environment (such as in soil or groundwater) by utilizing two or more essential chemical compounds.

**Contaminants/Contamination:**

Any chemical, biological or related substance that has an adverse affect on water, soil, or air.

**Fumigant:**

A substance used in fumigating.

**Fumigating:**

To apply smoke, vapor, or gas for the purpose of disinfecting or destroying pests.

**Groundwater:**

Water found within layers of material (such as soil, rock, clay, sand or gravel) below the ground surface.

**In-Situ:**

Actions conducted in their original location. With respect to remedial actions, “in-situ” refers to cleanup in place where soil or groundwater contamination exists.

**Long-Term Receptors:**

Ecological entities that may be exposed to a chemical ever a long time period, such as over many years.

**Maximum Contaminant Level (MCLs):**

The maximum level at which a particular chemical is allowed to exist in public drinking water supplies. MCLs are set and enforced through state and federal laws.

**Miticide:**

An agent used to kill mites.

**Monitored Natural Attenuation:**

The U.S. Environmental Protection Agency defines monitored natural attenuation as the “reliance on natural attenuation processes (within the context of a carefully controlled and monitored site cleanup approach) 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 concentrations of contaminants in soil or groundwater. These in-situ processes include biodegradation; dispersion; dilution; sorption; volatilization; radioactive decay; and chemical or biological stabilization, transformation, or destruction of contaminants.”

**Nematocide:**

A substance or preparation used to destroy nematodes.

**Nematodes:**

Any of a phylum (Nematoda or Nemata) of elongated cylindrical worms parasitic in animals or plants or free-living in soil or water – also called *roundworm*

**National Priorities List (NPL):**

A list of hazardous waste sites designated by EPA as needing long-term remedial cleanup. The NPL is also known as the Superfund list.

**Pathway:**

A path for the movement of groundwater, chemicals, or other environmental constituents.

**Perched Groundwater:**

A **saturated zone**, usually of limited area, located on a clay layer above the main groundwater zone.

**Plume:**

A body of contaminated groundwater originating from a specific source and influenced by such factors as the local groundwater flow pattern, density of the contaminant, and character of the aquifer.

**Proposed Plan:**

A document that summarizes all of the remedial action alternatives that were studied as part of the Remedial Investigation/Feasibility Study (RI/FS) process, and identifies the preferred remedial action alternative for a site.

**Receptor:**

Ecological entity exposed to a chemical.

**Record of Decision (ROD):**

A document explaining the cleanup actions that will be implemented at a contaminated site. The ROD is based on information and technical analyses generated during the Remedial Investigation/Feasibility Study and on comments received on the Proposed Plan.

**Remedial Investigation/Feasibility Study (RI/FS):**

The study process conducted at a Superfund Site to assess contamination and evaluate cleanup alternatives. The RI examines the nature and extent of contamination. The FS evaluates different methods for cleaning up the contamination.

**Saturated Zone:**

Any layer of soil or rock that contains pore spaces that are full of water.

**Superfund:**

Superfund is the trust fund established by CERCLA to investigate and clean up abandoned or uncontrolled hazardous waste sites.

**Information Repositories**

Copies of the Brown & Bryant Superfund Site Remedial Investigation/Feasibility Study and other site related technical documents for the Site are available for review at the locations listed below. These documents are part of the Administrative Record for the Brown & Bryant Superfund Site.

U.S. EPA Superfund Records Center  
95 Hawthorne Street, Room 403  
San Francisco, CA 94105-3901  
Telephone: (415) 536-2000  
Fax: (415) 764-4963

Hours: Monday through Friday: 8 am to 5 pm  
Saturday and Sunday: Closed

Kern County Library  
Arvin Branch  
123 A Street  
Arvin, CA 93203  
Telephone: (661) 854-5934  
Hours: Sunday and Monday: Closed  
Tuesday: 12 pm to 8 pm  
Wednesday through Friday: 10 am to 6 pm  
Saturday: 9 am to 5 pm (Library hours are subject to change)

**Additional Information**

For additional copies or information on the Proposed Plan for the Brown & Bryant Superfund Site, please contact the following:

- **Travis Cain,**  
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Or you may leave a message on the EPA's Office of Community Involvement toll free line at (800) 231-3075 and your call will be returned

## Mailing List Coupon

If you did not receive this Proposed Plan in the mail and would like to be included on the mailing list to receive future EPA mailings about the Brown & Bryant Superfund Site, please fill out this coupon and return it to the address printed on the reverse side of this self-mailer, Please cut on the line above, place a stamp as indicated, and drop into the mail.

**Luis Garcia-Bakarich**  
**Community Involvement Coordinator**  
**U.S. EPA Region 9, SFD-3**  
**75 Hawthorne Street**  
**San Francisco, CA 94105**

PLEASE PRINT ALL INFORMATION

Name: \_\_\_\_\_

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\*Organizational Affiliation: \_\_\_\_\_

You may also provide the above information via e-mail to [garcia-bakarich.luis@epa.gov](mailto:garcia-bakarich.luis@epa.gov), or via fax to (415) 947-3528

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