Omega Chemical Corporation Superfund Site

U.S. Environmental Protection Agency • Region 9 • San Francisco, CA • August 2010

Proposed Plan for OU-2 Groundwater Contamination

The United States Environmental Protection Agency (EPA) is requesting public comment on this **Proposed Plan** for addressing the human health and environmental risks posed by contaminated **groundwater** at the Omega Chemical Corporation **Superfund** Site (Site). The purpose of the Proposed Plan is to describe and solicit comments from the public on the alternatives considered, the Preferred Alternative and the information contained in the Administrative Record file. EPA is issuing this Proposed Plan as part of its public participation responsibilities under Section 300.430(f)(2) of the **National Oil and Hazardous Substances Pollution Contingency Plan (NCP)**. This Plan identifies EPA's Preferred Alternative for containing the large plume of contaminated groundwater that extends approximately four and one-half miles south-southwest of the former Omega Chemical Corporation in Whittier, CA. This area of the Site is designated as Operable Unit 2 (OU-2). EPA will select the remedy for OU-2 after reviewing and considering all information received during the public comment period.

On August 31, 2010, you are invited to attend an open house followed by a presentation at a public meeting. During the open house on this Proposed Plan from 6:00 pm to 7:00 pm, EPA staff will be available at a poster session to answer individual questions. EPA will make a formal presentation at the public meeting at 7:00 pm with an opportunity to ask questions and record oral comments on the Proposed Plan as part of the public record. You may also submit written comments at any time during the comment period which begins August 23, 2010 through September 21, 2010. Information on how to submit written comments and the location of the public meeting can be found in the box to the right.

This Proposed Plan summarizes key information from the OU-2 **remedial investigation and feasibility study** (RI/FS) conducted by EPA. The RI/FS reports describe the nature and extent of OU-2 groundwater contamination, the risks it poses to human health and the environment and the alternatives EPA evaluated to address those risks. EPA is proposing an interim remedial action to contain the plume of groundwater contamination. After implementation of the selected interim remedy, EPA will conduct further studies and expects to propose additional cleanup actions for a final cleanup remedy for the Site. EPA may modify the Preferred Alternative or select another response action presented in this Plan based on new information or public comments received during the comment period.

*Terms that appear in **bold** are defined in the glossary on pages 12-13

How You Can Comment

EPA encourages the public to comment on this proposed cleanup action for contaminated groundwater in OU-2. The comment period is from August 23, 2010 to September 21, 2010. You can comment in person at the public meeting or in writing to EPA's remedial project manager. You can fax, email or send in written comments postmarked **no later than September 21, 2010** to the following EPA contact:

Lynda Deschambault
Remedial Project Manager
U.S. EPA Region 9
75 Hawthorne Street (SFD-7-1)
San Francisco, CA 94105
Direct Line: (415) 947-4183
Fax Number: (415) 947-3526
Email: *deschambault.lynda@epa.gov*

If requested, EPA may extend the comment period. Any request for an extension must be made in writing and received by EPA no later than September 21, 2010.

Open House and Public Meeting

If you would like an opportunity to talk to EPA staff one-on-one, join us at the Open House just before the public meeting. To hear a presentation on the Proposed Plan and have the opportunity to have your comment recorded, please also attend the public meeting:

August 31, 2010
6:00 pm - 7:00 pm - Open House
7:00 pm - 9:00 pm -
Presentation & Public Comment

Whittier Community Center
7630 Washington Boulevard
Whittier, California

EPA consulted with the California EPA Department of Toxic Substances Control (DTSC) in preparing this Proposed Plan. The public can review the RI/FS reports and other Site documents in the Administrative Record file at the Site's **information repositories** (see back page). Information about the Site is also available on-line at **www.epa.gov/region09/OmegaChemical.**

EPA will make its decision on the remedy after considering all comments received during the public comment period. Public comments will be addressed in a responsiveness summary attached to the **Record of Decision** (ROD). The ROD will be placed in the information repositories and made available on-line at EPA's web site, and notice of its availability will be announced in a local newspaper.

Site Background

The Omega Chemical Corporation facility was located at 12504 and 12512 East Whittier Boulevard in Whittier, California and was a refrigerant and solvent recycling, reformulation and treatment facility that operated from approximately 1976 to 1991. Drums and bulk loads of waste solvents and other chemicals from various industrial activities were processed at the facility to form commercial products. As a result of the operations and spills and leaks of various chemicals, the soil and groundwater beneath the Omega property became contaminated with high concentrations of tetrachloroethylene (PCE), trichloroethylene (TCE), Freons 11 and 113 and other contaminants. Contaminated groundwater extends four and one-half miles downgradient (south / southwest) of the Omega Chemical property.

To better manage large site cleanups, EPA often addresses a site by designating Operable Units (OUs) which represent discrete elements of the overall site cleanup. The Omega Site has three OUs: OU-1 addresses the contaminated soil and groundwater in the immediate vicinity of the former Omega Chemical facility; OU-2 addresses the contaminated groundwater downgradient of OU-1 that has been impacted by contamination from the Omega facility; and OU-3 addresses **vapor intrusion** from the Omega Site that has occurred in several buildings on and in close proximity to the former Omega facility.

Enforcement History

Between 1984 and 1988, Omega Chemical received several notices of violations from the Los Angeles County Department of Health. In 1993 and 1995, at the request of DTSC, EPA conducted assessments of the Omega facility to evaluate the condition of approximately 2,900 drums of unprocessed hazardous waste in various states of deterioration, many of which were corroded and leaking. The drums were situated on pallets, in some cases three high, and many were weathered and deteriorating from years of outside storage. In May 1995, EPA issued a Unilateral Administrative Order (UAO) to "major" generators -- i.e., **potentially responsible parties** (PRPs) who had shipped at least 10 tons of hazardous substances to the facility -- requiring them to undertake a number of actions, including: securing the site, sampling and off-site treatment/disposal of more than 3,000 drums of waste and decontamination of remaining equipment and structures. The major PRPs later formed the Omega Chemical Site PRP Organized Group (OPOG) that has continued to perform some of the response actions at the Site.

In January 1999, EPA placed the Omega Site on the National Priorities List (NPL or Superfund list).

OPOG also agreed to perform a number of actions pursuant to a 2001 consent decree, including performance of an RI/FS of the OU-1 soils and implementation of an interim groundwater treatment system to contain OU-1 groundwater. Construction of this pump-and-treat system was completed in 2009, and it is now operational. The treated water from this 35-gallon-per-minute (gpm) system is discharged to a sanitary sewer.

In 2004, EPA issued a UAO to other major generators that required them to install and sample additional groundwater monitoring wells.

In April 2006, EPA issued an Action Memorandum identifying response actions needed to mitigate threats to human health posed by vapor intrusion in the Skateland building, an indoor roller skating rink adjacent to the former Omega Chemical facility. OPOG performed this removal action pursuant to an amendment to the 2001 consent decree and ultimately funded the purchase of the Skateland property and demolished the building.

In 2007-2008, with EPA oversight, OPOG conducted the RI/FS for the soils in OU-1. EPA issued a ROD for OU1 selecting the soil cleanup remedy in September 2008. The remedial action selected in the ROD consisted of a **soil vapor extraction** (SVE) system to remove and treat the chemical vapors in the soil within OU-1. A series of SVE wells will be used to pull the contaminant vapors out of the soil and into a **granular activated carbon** (GAC) filter. Once the contaminants are removed by the GAC filter, the clean air created through this process will be released into the atmosphere.

In 2009, EPA entered into an agreement with OPOG to address indoor air contamination caused by vapor intrusion. Under the agreement, OPOG has installed an interim SVE

system and is taking other measures to address vapor intrusion at buildings in the OU-1 area. These actions will be consistent with the long-term cleanup of the OU-1 soils. The agreement also requires OPOG to continue indoor air monitoring in several buildings near the former Omega Chemical facility. Under a consent decree that has been signed by more than 150 PRPs and the United States, members of OPOG will perform the OU-1 soils remedy EPA selected in September 2008.

EPA has taken the lead role in conducting the RI/FS for OU-2, including the installation of numerous monitoring wells, the evaluation of numerous facilities within the OU-2 area that may be contributing contamination to the Omega plume and the assessment of potential risks posed by the OU-2 plume. During the course of the RI/FS, EPA has held numerous meetings with stakeholders, issued several fact sheets to update the public on progress at the Site and provided OPOG and others with an opportunity to review the draft RI and FS reports. In July 2010, EPA completed the RI/FS reports for OU-2.

Site Characteristics

The former Omega Chemical facility is located in Los Angeles County, approximately 15 miles southeast of Los Angeles. The Site and surrounding areas are completely developed with a mix of predominantly commercial/industrial and minor residential land use. Land uses are not expected to change significantly in the next 20 years or longer. The groundwater basin is an important source of drinking water for the metropolitan area east of Los Angeles including the cities of Whittier, Santa Fe Springs and Norwalk. The use of groundwater in the basin is subject to adjudicated water rights administered by the Water Replenishment District of Southern California (WRD) as acting Watermaster for the Central Basin.

The August 2010 RI/FS for OU-2 found that the contaminated groundwater is present starting at the water table (that occurs at approximately 40 to 100 feet below ground surface (bgs)) and extends down to 200 feet bgs in some places. The **plume** of contaminated groundwater extends approximately 4½ miles south-southwest from the former Omega Chemical facility in the City of Whittier, through the City of Santa Fe Springs and into the City of Norwalk (Figure 1). The width of the contaminated groundwater plume varies from approximately one-half to one mile.

Within the OU-2 plume, there are two distinct "hot spots" of contamination where PCE concentrations exceed 500 micrograms per liter (µg/L) (see Figure 2). The first originates at the former Omega Chemical facility and extends for a distance of roughly one mile downgradient. The second hot spot starts a short distance downgradient of the first and continues for about one-half mile.

Groundwater within the OU-2 area is used as a source of drinking water by several municipal and private water purveyors. Most of the drinking water wells located in the OU-2 area draw water primarily from deeper portions of the aquifer at depths of 200 feet bgs or more and are not currently impacted by groundwater contamination. However, a few drinking water wells in the area draw water at about the 200 feet bgs level and have had some contaminants detected. These wells are currently equipped with **wellhead treatment units** which are comprised of granular activated carbon (GAC) filters. The GAC filter removes the contaminants from the water to ensure that it meets drinking water standards. Drinking water for the cities of Whittier, Santa Fe and Norwalk is tested regularly prior to distribution to the public, and all tap water meets state and federal drinking water standards.

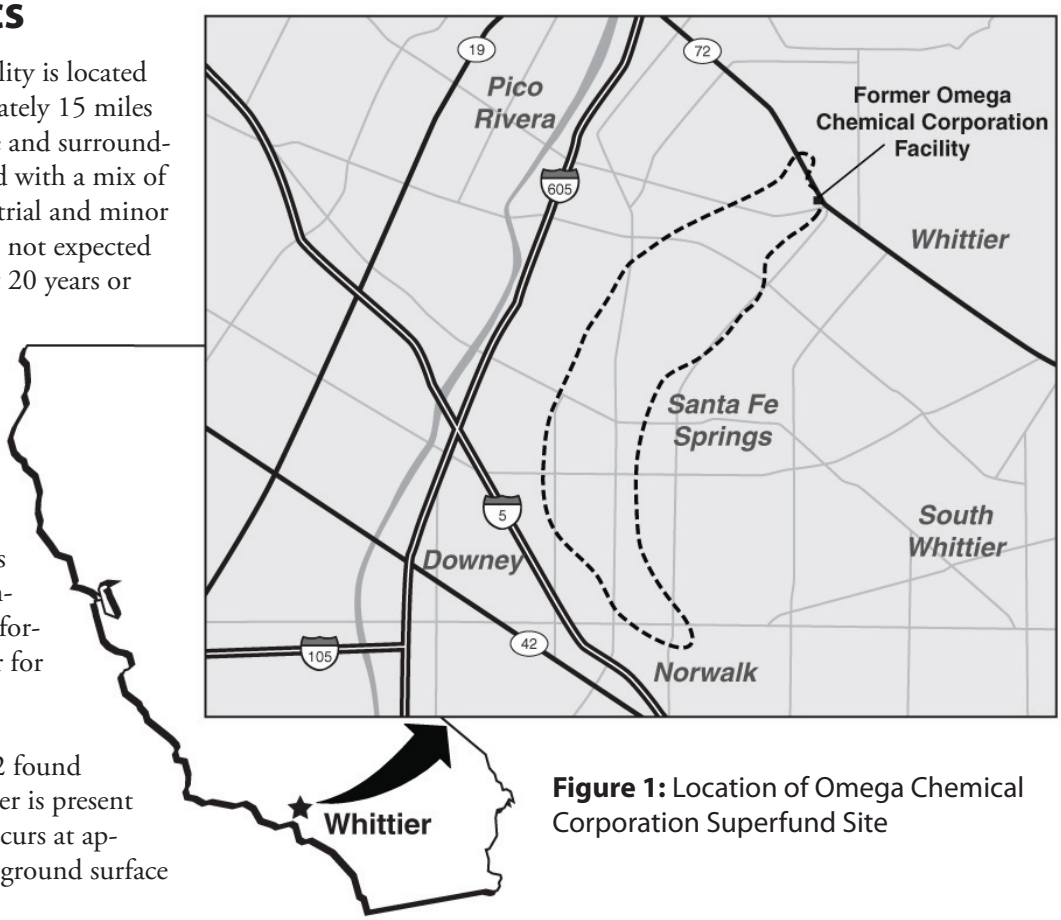

Figure 1: Location of Omega Chemical Corporation Superfund Site

Contaminants of Concern

The primary **contaminants of concerns** (COCs) at OU-2 are **volatile organic compounds** (VOCs) dissolved in groundwater. VOCs are contaminants that readily evaporate in the air. The primary VOCs of concern are PCE**,** TCE**,** and **1, 1-dichloroethene** (1, 1-DCE). PCE and TCE are solvents that have been widely used by industry as cleaning and degreasing agents. 1, 1-DCE is not commonly used in commercial products but can be formed when other VOCs degrade.

Another group of VOCs found in OU-2 groundwater are Freons (e.g., Freon 11 and Freon 113). Freons are used as coolants and pressurizers in spray can products. Less volatile or semi-volatile organic compounds (SVOCs), including **1, 4-dioxane**, are also present at OU-2. The groundwater also contains some degradation by-products that are formed when PCE and TCE degrade in the environment.

A number of other COCs in OU-2 groundwater that were not part of the Omega Chemical facility operations have been spilled or dumped or otherwise disposed of at facilities within the area overlying the OU-2 plume and are now commingled with the OU-2 plume. Those chemicals include **chromium (hexavalent** and **total), perchlorate, selenium, fuel hydrocarbons and others.** A complete list of the main COCs can be found in Table 1.

There are no known **principal threat wastes** (such as dense non-aqueous phase liquids, or DNAPLs) in the OU-2 groundwater plume.

Table 1: Main Contaminants of Concern in OU-2 Plume

Contaminant	Maximum Concentration in OU-2 (ug/L)	Drinking Water Standard (ug/L)
Chloroform	1,200	80
Carbon tetrachloride	180	0.5
Freon 11	910	150
Freon 113	2,400	1,200
Hexavalent Chromium	206	50*
1,4-Dioxane	210	3**
Perchlorate	10	6
1,1-Dichloroethene (1,1-DCE)	2,700	6
cis-1,2-Dichloroethene (cis 1,2-DCE)	370	22
1,1-dichloroethane (1,1-DCA)	200	5
1,2-dichloroethane (1,2-DCA)	73	0.5
1,1,2-Trichloroethane (1,1,2-TCA)	11	5
Tetrachloroethylene (PCE)	4,600	5
Trichloroethylene (TCE)	2,000	5

*Total Chromium MCL
**No MCL – value shown is the State notification level

Scope and Role of the Proposed Action

The main components of a typical groundwater cleanup action include control of the source of the contamination, containment of contaminated groundwater to prevent it from spreading further away from the Site and removal of the contamination from the groundwater in order to achieve cleanup standards in the **aquifer**.

The area of highly contaminated groundwater within OU-1 is presently being controlled by an interim **pump-and-treat system** that began operation in July 2009. In addition, the design and construction of the soil remedy for OU-1 (soil vapor extraction throughout the **vadose zone**) will begin in 2010.

With this Proposed Plan, EPA is proposing an interim remedy to contain the plume of contaminated groundwater comprising OU-2 (see Figure 2). The overall objective of the proposed interim remedy is to protect human health and environment by preventing further spreading of the contaminated groundwater to yet uncontaminated portions of the aquifer and nearby production wells. The specific **Remedial Action Objectives** developed for the interim remedial action are identified below. Because this action is considered "interim," EPA is not setting numeric cleanup goals for the groundwater in the aquifer (i.e., "*in situ*" cleanup goals) at this time.

Following implementation of the selected interim remedy for OU-2, EPA will conduct further studies and expects to propose additional remedial actions for the OU-2 plume as part of the final cleanup remedy for the Site. As part of those studies, EPA will work with the State to identify all significant sources within the OU-2 plume area that have contributed to the groundwater

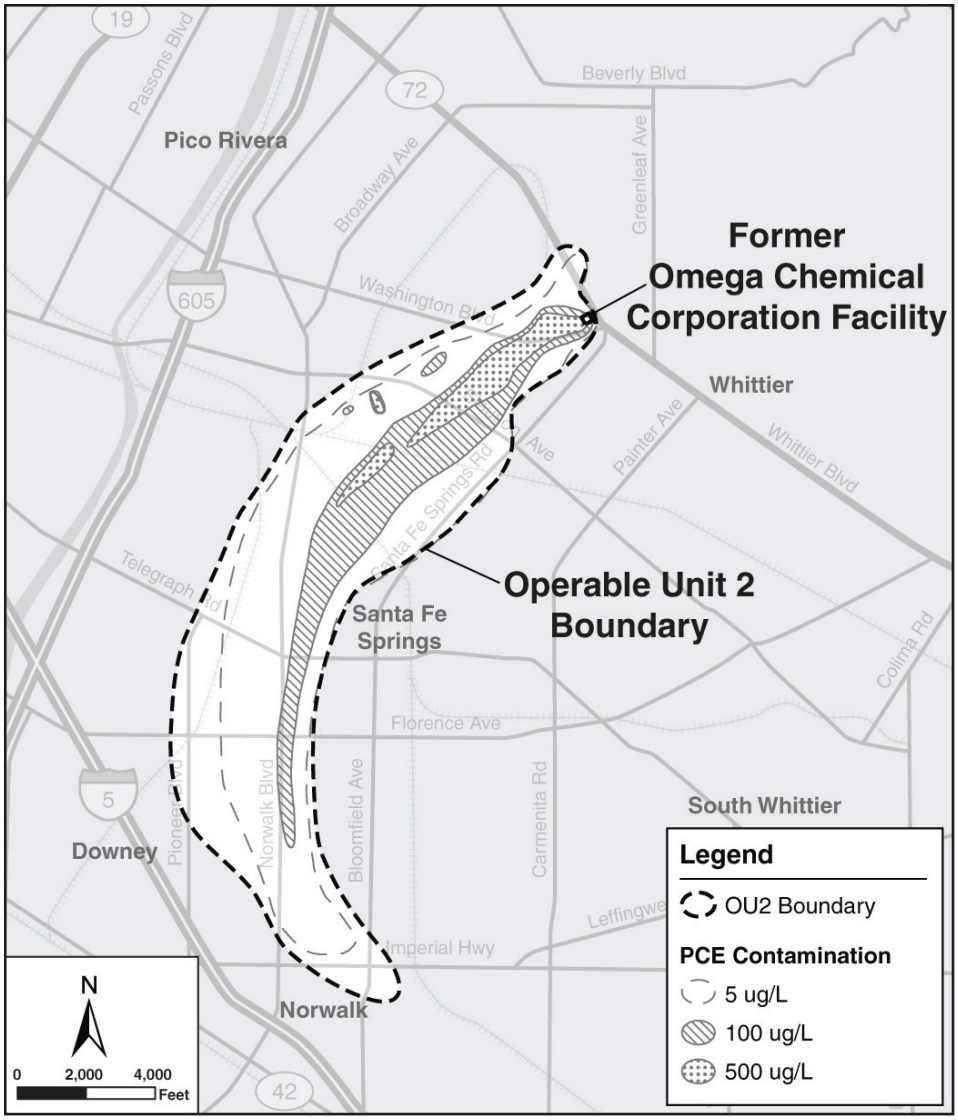

Figure 2: Approximate extent of tetrachloroethylene (PCE) groundwater contamination

contamination. Some of the known sources are currently being addressed by State-led actions. EPA expects that the rest of the sources will be addressed by the combined efforts of the State and EPA.

Summary of OU-2 Risks from Contaminated Groundwater

As part of the OU-2 RI, a **human health risk assessment** (HHRA) was performed to determine if groundwater contamination at OU-2 poses a current or potential future risk to human health. The HHRA identified and evaluated several possible ways that people might be exposed to OU-2 groundwater contamination. These "exposure pathways" included direct exposure to untreated OU-2 groundwater used as residential tap water and inhalation exposure to volatile contaminants (such as PCE and TCE) as a result of off-gassing from the contaminated groundwater and subsequent vapor intrusion into buildings overlying the plume.

The risks identified in the HHRA were compared against EPA's target risk management range of 10^{-6} to 10^{-4} for cancer risks (in other words, a cancer risk of 1 to 100 people in 1 million). The HHRA results indicated that the OU-2 contaminated groundwater does not pose a current or immediate risk to human health but could pose a significant potential future cancer risk through domestic use of contaminated groundwater. The estimated potential future cancer risk from exposure to untreated OU-2 groundwater used as residential tap water is 9×10^{-1} (i.e., 9 in 10 people). PCE contributes 98 percent of the total cancer risk.

All water supply wells known to be impacted by the OU-2 plume have wellhead treatment units that remove the contaminants such as PCE before the water is put into the distribution system, preventing any current exposure via that pathway. However, there is the potential for the contaminated groundwater to migrate into deeper and/or uncontaminated downgradient portions of the aquifer and impact production wells that do not have wellhead treatment units.

The HHRA also concluded that there is no potential for inhalation exposure in buildings overlying the OU-2 plume. The HHRA and other EPA studies have found that the vapor intrusion problem is limited to those commercial buildings that are either on, or in close proximity to, the former Omega property.

Because of the depth to groundwater, there is no risk to ecological receptors from contaminants in OU-2 groundwater. The Site and surrounding areas are completely developed with a mix of predominantly commercial/industrial and minor residential land use. EPA does not expect the future land or resource uses in this area to change.

It is the EPA's current judgment that the Preferred Alternative identified in this Proposed Plan, or one of the other active measures considered in the Proposed Plan, is necessary to protect public health and the environment from actual or threatened releases of hazardous substances into the environment.

Remedial Action Objectives

This Proposed Plan presents EPA's preferred alternative for interim groundwater containment as the first step in addressing groundwater contamination in OU-2. There are three primary goals, or **Remedial Action Objectives** (RAOs), developed for the interim containment remedy for OU-2:

- Prevent unacceptable human exposure to COCs in groundwater.
- Decrease lateral and vertical spreading of COCs in groundwater at OU-2 to protect current and future uses of groundwater.
- Decrease lateral and vertical migration of OU-2 groundwater with high concentrations of COCs into zones with currently lower concentrations of COCs to optimize the efficiency of contaminant mass removal and the treatment of extracted groundwater.

Summary of the Remedial Alternatives

Based on the available information about the current nature and extent of groundwater contamination at OU-2, EPA developed and evaluated a range of alternatives for achieving the OU-2 RAOs. The five "action" alternatives are groundwater "pump-and-treat" systems that have six key components: extraction of contaminated groundwater; treatment of the groundwater to remove contaminants; use of groundwater after treatment; conveyance pipelines for untreated and treated water as well as waste streams; groundwater monitoring; and institutional controls. The alternatives incorporate different combinations of technologies, process options and treated water end use, and they also vary in terms of the number and location of groundwater extraction wells. The following groundwater monitoring and institutional controls components are essentially the same for all five of the "action" alternatives:

- **Groundwater monitoring:** Construction of additional monitoring wells and periodic monitoring of both new and existing monitoring wells. Monitoring groundwater levels and groundwater quality will allow for evaluation of the effectiveness of the containment remedy.
- **Institutional controls (ICs):** An annual notification to all water rights holders in the Central Basin would explain (1) the extent of OU-2 groundwater contamination, the selected interim OU-2 groundwater remedy pursuant to the interim OU-2 ROD and the status of the remedy's implementation; and (2) restrictions and prohibitions under state or local law on well-drilling and installation without necessary approvals and permits. In addition to the notice, this IC includes meetings as necessary with state and local agencies with jurisdiction over well drilling and groundwater use within the Central Basin to determine whether any permits for well installation had been applied for or granted in the OU-2 area or vicinity and, if so, whether such application or permit is consistent with the objectives of the interim OU-2 ROD.

The alternatives are summarized below and described in detail in the FS Report. The cost estimates developed for each alternative assume a 30-year period of operation and maintenance (O&M) and a discount rate of 7% to calculate the total cost in current dollars (i.e., net present value (NPV)). EPA's Preferred Alternative is Alternative 6, plume-wide extraction with drinking water end use.

Alternative 1: No Action

EPA is required to evaluate a "No Action" alternative under the NCP. This alternative establishes a baseline against which other alternatives can be compared. The "No Action" alternative would allow the OU-2 contamination to continue to migrate with no remedial actions being implemented (other than those that might be taken as part of State-led actions at individual sources within the OU-2 area).

Alternative 2: Leading-edge Extraction with Drinking Water End Use

Alternative 2 consists of groundwater extraction at the leading edge of the plume to prevent further migration of contaminated groundwater into the downgradient areas. The contaminated groundwater would be removed and piped to a centralized treatment plant. The treated water would be distributed to a municipal water supply system for use as drinking water.

This alternative is estimated to require three **extraction wells** located at the leading edge of the OU-2 plume with extraction rates of approximately 600 gallons per minute (gpm) each for a total extraction rate of 1,800 gpm. The extracted contaminated groundwater would be sent through a pipeline to a groundwater treatment plant (GWTP) for removal

of contaminants to levels that comply with drinking water standards. For the purpose of estimating costs only, it was assumed that the treated water would be delivered via pipeline to an existing potable drinking water tank owned and operated by the City of Santa Fe Springs.

The following key treatment steps would be conducted at the GWTP: an advanced oxidation process (AOP) to remove 1,4-dioxane, biological and conventional liquid phase granular activated carbon (LGAC) for VOC removal, and nanofiltration (NF) for removal of chromium and total dissolved solids (TDS), including sulfate. The groundwater in this area contains high levels of naturally-occurring dissolved solids which would be removed when the water is treated. The resulting high salinity "brine", a byproduct of the treatment process, would be discharged to a nearby industrial sewer line for disposal.

Capital Costs:	$29.2 million
Annual O&M:	$ 2.0 million
Estimated Present Worth Cost:	$53.6 million

Alternative 3: Plume-wide Extraction with Reclaimed Water End Use

Alternative 3 includes groundwater extraction at three locations and the delivery of treated water that meets requirements for use in reclaimed water lines.

In addition to extracting groundwater at the leading edge of OU-2 plume, Alternative 3 would include extraction of highly contaminated groundwater at two additional locations to more effectively contain or remove groundwater contamination. The two extraction locations, referred to as the northern (NE) and central (CE) extraction areas, are downgradient of the two major hot spots within the plume (Figure 4). Extracted groundwater would be treated at a centralized GWTP located in the vicinity of the CE extraction area. The treated water would be discharged to a reclaimed water line. The reclaimed water end use (for non-drinking purposes, such as irrigation or industrial use) under this alternative would be consistent with water conservation efforts in the Central Basin.

The extraction system under this alternative assumes there would be two NE wells with extraction rates of approximately 250 gpm each, two CE wells with extraction rates of approximately 250 gpm each and three leading-edge wells with extraction rates of approximately 350 gpm each. The total extraction rate would be about 2,050 gpm for this plume-wide extraction scenario. At the GWTP, the groundwater would go through an ion exchange system to remove hexavalent chromium, AOP to remove 1, 4 dioxane, biological and conventional granular activated carbon to remove VOCs, and reverse osmosis (RO) treatment to reduce selenium and total dissolved solids (TDS), including sulfate, to meet reclaimed water discharge limits. This alternative includes pipelines to move treated water to a nearby reclaimed water line and to discharge waste brine from the GWTP to a nearby industrial sewer.

Capital Costs:	$40.1 million
Annual O&M:	$ 3.7 million
Estimated Present Worth Cost:	$86.6 million

Alternative 4: Plume-wide Extraction with Reinjection

Alternative 4 would have the same extraction well network as Alternative 3, but the treated water would be reinjected into the deep aquifer beneath the plume. The replenishment of the drinking water aquifers under this alternative would be consistent with water conservation efforts in the Central Basin.

The extraction system under this alternative would be the same as for Alternative 3 and has a total extraction rate of approximately 2,050 gpm for the plume-wide extraction. The GWTP would incorporate the same treatment steps as in Alternative 2 except that it would use a more robust reverse osmosis system instead of a nanofiltration process to provide a higher degree of contaminant removal prior to injection of the groundwater. The State of California's antidegradation policy has established water quality limits for reinjected water that are stricter than those for other water end uses. The treated water would be pumped to injection wells located near the GWTP.

Capital Costs:	$41.4 million
Annual O&M:	$ 2.6 million
Estimated Present Worth Cost:	$73.2 million

Alternative 5: Plume-wide Extraction with Spreading Basin Recharge

Alternative 5 is identical to Alternatives 3 and 4 with regard to extraction well locations but differs in that the treated water would be delivered to the nearby San Gabriel Spreading Basin for infiltration into the ground. More specifically, this treated water would be discharged to the unlined portions of the San Gabriel River that are part of the regional spreading basin area. From there, the treated water would infiltrate into the deep drinking water aquifers of the Central Basin. The replenishment of the drinking water aquifers under this alternative would be consistent with water conservation efforts in the Central Basin.

The extraction well system under this alternative would have an extraction rate that is about 10 percent higher than Alternatives 3 and 4 and 20 percent higher than Alternative 2. The spreading basin areas undergo routine maintenance and are not available for approximately five weeks per year. In order to ensure the plume of contaminated water is adequately captured during the remainder of the year, this system would pump at an overall extraction rate that is approximately 2,200 gpm.

The GWTP incorporates the same treatment steps as Alternative 3 and includes ion exchange, AOP, LGAC and RO treatment units.

Capital Costs:	$41.6 million
Annual O&M:	$ 3.3 million
Estimated Present Worth Cost:	$82.9 million

Alternative 6: Plume-wide Extraction with Drinking Water End Use

Alternative 6 is the Preferred Alternative. It is similar to Alternatives 3, 4 and 5 in that it incorporates the same plume-wide extraction scenario with groundwater extraction at the leading edge, CE and NE areas. Alternative 6 also is similar to Alternative 2 in that groundwater will be treated and distributed to a municipal water supply system as drinking water. Extracted contaminated groundwater will be treated with a centralized GWTP located in the vicinity of the CE extraction area.

The extraction system under this alternative is the same as for Alternatives 3, 4 and 5, with a total extraction rate of about 2,050 gpm for the plume-wide extraction system. The GWTP would use the same treatment technologies as those found in Alternative 2, which would include an advanced oxidation process, biological and conventional liquid phase granular activated carbon (LGAC), nanofiltration and disinfection.

Capital Costs:	$38.4 million
Annual O&M:	$ 2.5 million
Estimated Present Worth Cost:	$69.2 million

Evaluation of Alternatives

The NCP requires the use of nine criteria to evaluate the different remediation alternatives individually and in comparison to each other. These criteria are grouped into three categories: threshold criteria, which are requirements that each alternative must meet in order to be eligible for selection; primary balancing criteria, which are used to weigh major trade-offs among alternatives; and modifying criteria, which include state and community acceptance. See Figure 3 for a description of these criteria.

Table 2 summarizes the comparative analysis of alternatives using these criteria. Each alternative is compared to the other five and rated "yes" or "no" with respect to the threshold criteria, and "low," "medium," or "high" with respect to the primary balancing criteria (except cost). A high rating is most favorable and a low rating is least favorable. Rather than rating costs on a relative scale, the estimated costs for each alternative are presented in Table 2 for comparison. A more detailed analysis of each alternative against the criteria and a comparative analysis of the alternatives can be found in the Feasibility Study report.

The comparative evaluation using the two threshold criteria and the five primary balancing criteria is discussed below. The Department of Toxic Substances Control, as the lead agency for the State, concurs with EPA's selection of Alternative 6 as the preferred alternative. The other modifying criterion, community acceptance, will be evaluated by EPA after the public comment period ends. In addition, the green assessment or environmental footprint of each alternative is also discussed below.

Overall Protection of Human Health and the Environment

Alternative 1 (No Action), by allowing the plume to continue migrating, does not provide long-term protection of human health and the environment, and therefore does not meet this criterion. Alternative 2 is also rated "no" while Alternatives 3, 4, 5 and 6 are each rated "yes" with respect to this threshold criterion. The latter alternatives will achieve a high degree of plume containment, particularly when compared to Alternatives 2. Alternative 2, for which the extraction wells are all located at the leading edge of the contaminated groundwater plume, is predicted to achieve less than adequate vertical (as well as lateral) capture of the contaminated groundwater. Alternative 3 would provide less overall containment than Alternatives 4, 5 and 6 because the amount of water that could be extracted would be constrained during periods of little or no demand for reclaimed water. Reclaimed water demand is seasonal and varies considerably throughout the state.

Compliance with Applicable or Relevant and Appropriate Requirements

Alternatives 2 through 6 are all rated "yes" with regard to the threshold criterion of compliance with applicable or relevant and appropriate requirements (ARARs).

Figure 3: EPA's Nine Evaluation Criteria

Long-Term Effectiveness and Permanence

Alternatives 2, 3, 4, 5 and 6 would permanently remove contaminants from the extracted groundwater and would achieve varying, but generally high, degrees of long-term effectiveness and permanence. Alternative 2 would not remove as much contamination as the other alternatives because it would extract relatively diluted contaminated groundwater from the leading edge only and none from within the plume itself. Alternatives 3, 4, 5 and 6 are ranked high because the installation of extraction wells throughout the plume will result in immediate capture of the more highly contaminated groundwater and provide more certainty with respect to preventing its vertical and lateral migration.

Reduction of Toxicity, Mobility, or Volume through Treatment

Alternatives 2 through 6 all use treatment to achieve (to varying degrees) reduction of toxicity, mobility and volume of contaminants. Alternative 2 (leading edge extraction only) would likely allow contamination from high concentration areas to migrate into low concentration areas and also into portions of the deeper regional aquifer that are currently clean. Alternative 2 would also allow high concentration areas to migrate towards the deep production wells within the OU-2 area. Alternatives 3, 4, 5 and 6 all include plume-wide extraction wells and would result in improved plume capture (and thus mobility reduction) compared with Alternative 2. Alternatives 4, 5 and 6 are ranked high with regard to this criterion because these alternatives treat similar volumes of water having higher concentrations of contaminants compared to Alternatives 2 and 3. Alternative 2 is ranked medium because it will not treat groundwater that is as highly contaminated compared to the other alternatives; this alternative only extracts and treats water from the less contaminated leading edge. Alternative 3 is ranked medium because it will extract more of the highly contaminated groundwater than Alternative 2, but the amount of water this alternative can extract would likely be constrained by seasonal demands for the reclaimed water it produces.

Table 2: Comparative Analysis of Alternatives

Evaluation Criteria	Alternatives					
	1 No Action Alternative	2 Leading Edge Extraction with Drinking Water End Use	3 Plumewide Extraction with Reclaimed Water End Use	4 Plumewide Extraction with Reinjection	5 Plumewide Extraction with Spreading Basin Recharge	6 (Preferred Alternative) Plumewide Extraction with Drinking Water End Use
Overall Protection of Human Health and Environment	NO	NO	YES*	YES	YES	YES
Compliance with ARARs	NA	YES	YES	YES	YES	YES
Long-term Effectiveness and Permanence	LOW	MEDIUM	HIGH	HIGH	HIGH	HIGH
Reduction of Toxicity, Mobility, or Volume (TMV) Through Treatment	NA	MEDIUM	MEDIUM	HIGH	HIGH	HIGH
Short-term Effectiveness	NA	HIGH	HIGH	HIGH	HIGH	HIGH
Implementability	NA	MEDIUM	LOW	MEDIUM	MEDIUM	MEDIUM
Cost (millions)	$0	Capital $29.2 Annual O&M $2.0 NPV of O&M $24.4 **Total NPV $53.6**	Capital $40.1 Annual O&M $3.7 NPV of O&M $46.5 **Total NPV $86.6**	Capital $41.4 Annual O&M $2.6 NPV of O&M $31.8 **Total NPV $73.2**	Capital $41.6 Annual O&M $3.3 NPV of O&M $41.3 **Total NPV $82.9**	Capital $38.4 Annual O&M $2.5 NPV of O&M $30.8 **Total NPV $69.2**
State Agency Acceptance	DTSC concurs with EPA's preferred alternative.					
Community Acceptance	Community acceptance for the recommended alternative will be evaluated after the public comment period.					

*As long as there is sufficient year round demand for the reclaimed water
NA – Not applicable.
Net Present Value (NPV) is based on 30-year O&M period using a 7% discount rate.

Short-term Effectiveness

Alternatives 2 through 6 all rely upon proven technologies and practices for both construction and operation. All will be constructed within one year of completion of design, with minimal expected impacts on workers, residences and the environment during implementation. Alternative 3 would be slightly faster to design because of less strict treatment requirements for reclaimed water.

Implementability

Alternatives 2 through 6 are considered to be technically feasible to implement. Vendors are available for materials, and contractors are readily available and capable of providing design, construction and operation services for these systems. The implementability of the alternative remedies for OU-2 is primarily driven by the regulatory environment and the water rights issues in the Central Basin area. Coordination with the Water Replenishment District of Southern California (WRD) (which serves as the Watermaster for this area of the Central Basin) and with water purveyors would be necessary for all alternatives.

Alternative 3 (reclaimed water end use) would also require coordination with the Los Angeles County Sanitation Districts (LACSD), the main supplier of regional reclaimed water. There is often low seasonal reclaimed water demand in this area. Low demand would require a corresponding decrease in groundwater extraction rates which would negatively impact plume capture and/or a negotiated agreement with the LACSD to cut back on the amount of reclaimed water they produce and to accept the excess reclaimed water from the OU-2 remedy in exchange.

Water rights are difficult to obtain, and basin water replenishment fees would likely be assessed. EPA considered combining this alternative with another end use alternative, but regional reclaimed water supply far exceeds demands and there is no need for additional reclaimed water sources in this region. Alternative 3 has a relatively low ranking because of the potential lack of consistent demand for reclaimed water. Therefore Alternatives 2, 4, 5 and 6 rank higher for implementability than Alternative 3.

Costs

A summary of capital, annual operation and maintenance (O&M), and total costs (i.e., net present value, NPV, which represents the total costs in current dollars) for each alternative is presented in Table 2. The cost estimates have an expected accuracy of +50% to -30%.

Alternative 2 costs (both capital and O&M) would be less than the other alternatives, primarily because the water is extracted only at the leading edge and associated pipeline costs are lower.

The remaining alternatives have comparable capital costs. Annual O&M costs are significantly higher for Alternatives 3 and 5 relative to the others. After Alternative 2, Alternative 6 has the next lowest total cost, about $69,000,000.

Green Cleanup Assessment

The environmental impacts of cleanup activities was about the same for each alternative (except No Action) because all the alternatives have similar energy use and extent of construction activities, and they all incorporate conservation of groundwater resources. Alternative 2, with extraction only at the leading edge, had the lowest environmental footprint (because it requires less piping and energy consumption) and was ranked medium with regard to this criterion. Alternatives 3, 4, 5 and 6 had somewhat larger environmental footprints and were consequently ranked lower relative to Alternative 2. Green remediation principles and techniques will be incorporated into the selected alternative during the remedial design phase to the maximum extent practicable. For example, the use of alternative energy sources and low energy-consuming equipment (such as variable frequency motors) can be coupled with optimum pipeline routing, sizing and material selection to lower the environmental impacts of the remedy.

Preferred Alternative

EPA's preferred alternative is Alternative 6, which includes the location of extraction wells at three locations along the plume and treatment of the contaminated groundwater for drinking water end use. EPA believes that Alternative 6 presents the most reasonable and cost-effective remedial approach to achieve containment of the OU-2 plume.

Based on the information currently available, EPA believes the preferred alternative meets the threshold criteria and provides the best balance to meet the evaluation criteria among the other alternatives. This alternative will achieve significant risk reduction by containing the contaminated plume to the same degree or better than the other alternatives. It provides permanent and significant reduction in the toxicity, mobility and volume of VOCs in the groundwater at OU-2.

This alternative also has the lowest estimated total cost of all the plume-wide containment alternatives. In addition, the water is reused in a safe and beneficial way that is consistent with regional water conservation and reuse efforts. The drinking water end use is consistent with regional efforts to reduce the amount of potable water that is imported into Southern California. The State has concurred with EPA's preferred alternative.

EPA believes Alternative 6 meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the nine criteria. EPA expects Alternative 6 to satisfy the following statutory requirements of CERCLA Section 121(b): (1) be protective of human health and the environment; (2) comply with ARARs (or justify a waiver); (3) be cost-effective; (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and (5) satisfy the preference for treatment as a principal element.

EPA will fully evaluate community acceptance after the public comment period ends and will summarize that evaluation in the ROD.

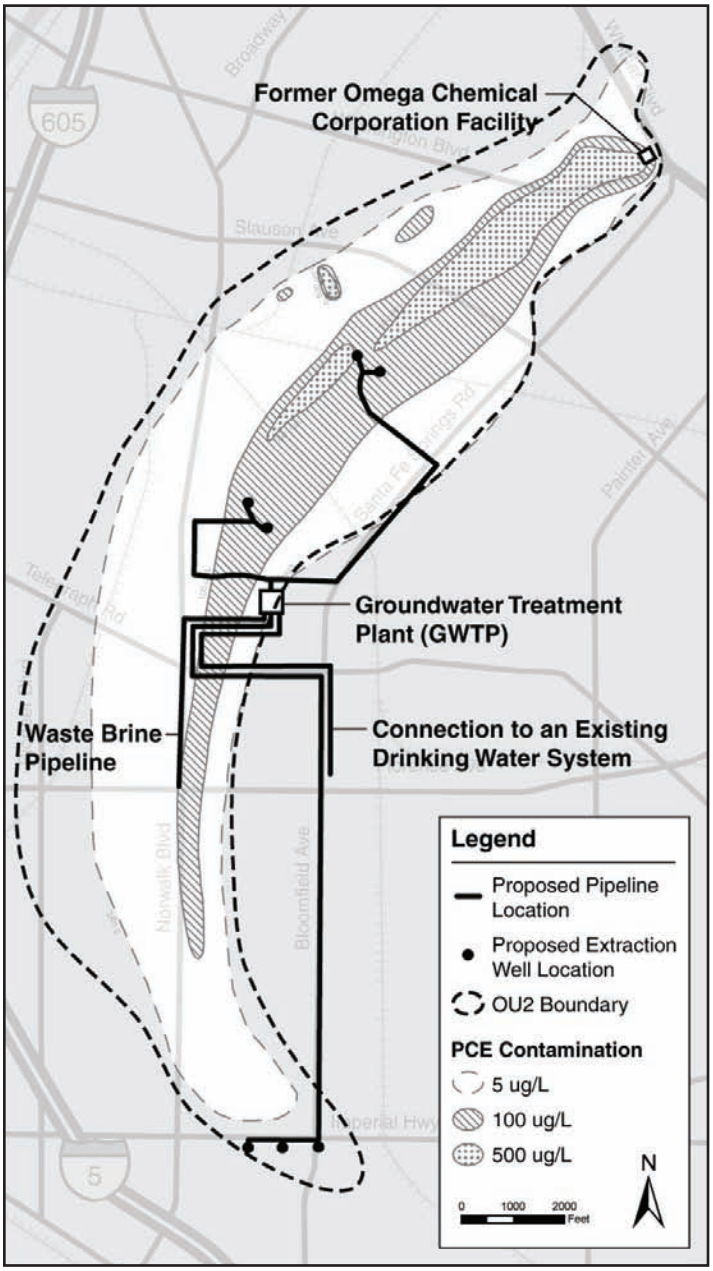

Figure 4: Schematic of EPA Preferred Alternative

A schematic diagram of the expected locations of extraction wells, treatment plant and pipelines for Alternative 6 is provided in Figure 4. Final locations will be determined during design.

Next Steps

The 30-day public comment period on this Proposed Plan ends on September 21, 2010. After EPA considers all public comments and issues the OU-2 ROD, EPA will distribute a fact sheet summarizing the ROD and otherwise notify stakeholders and the public of the selected remedy and availability of the ROD.

Technical Assistance Program

A Technical Assistance Grant (TAG) is available for citizens who live near a Superfund site. The grant helps qualified citizen groups affected by a Superfund site to hire an independent technical advisor to help interpret and comment on site-related information. An initial grant of up to $50,000 is available. For further information about the grant, please call us and request an application (toll free 800-231-3075) or go to **http://www.epa.gov/superfund/community/tag/resource.htm.**

Glossary of Terms

Aquifer: An underground geological formation, or group of formations, containing water. This is a source of groundwater for wells and springs.

Administrative Record: The supporting documents that EPA considers or relies on to select a remedial action.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): A federal law first passed in 1980, and subsequently amended, that created a trust fund, known as Superfund, to investigate and clean up abandoned or uncontrolled hazardous waste sites.

Consent Decree: A legal document approved and issued by a judge that formalizes an agreement reached between EPA and potentially responsible parties where they perform all or part of a site cleanup.

Contaminants of Concern: Site-specific chemicals that exceed regulatory levels or pose a potentially significant risk to human health and the environment.

Extraction Well: A discharge well used to remove groundwater or air.

Glossary of Terms *(Continued)*

Feasibility Study: A study that determines the best way to clean up environmental contamination.

Granular Activated Carbon (GAC) Treatment: A filtering system often used in small water systems and individual homes to remove organics. Also used by municipal water treatment plants. GAC treatment can also be highly effective in lowering elevated levels of radon in water.

Groundwater: The supply of water found below the ground surface, usually in aquifers.

Human Health Risk Assessment: The qualitative and quantitative evaluation of the risk posed to human health by the specific pollutants found at the Site.

Information Repository: A location accessible to community members (such as a local library) that houses documents, reports and other site-related information, general information about Superfund, newspaper notices, and the Administrative Record for the site. EPA also maintains an information repository for all Superfund sites at its offices in San Francisco, California.

Institutional Controls: Land use restrictions and other non-engineering controls that prevent or limit exposure to contamination.

National Priorities List (NPL): EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under Superfund. The list is based primarily on the score a site receives from the Hazard Ranking System. EPA is required to update the NPL at least once a year. A site must be on the NPL to receive money from the Trust Fund for remedial action.

National Oil and Hazardous Substances Pollution Contingency Plan (NCP): Provides the organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances. The NCP is the primary federal regulation governing the investigation and cleanup of Superfund sites.

Plume: A body of contaminated groundwater originating from a specific source.

Pump and Treat System: A system that uses one or more extraction wells to remove contaminated ground water and treat it to remove the contamination before the water is used or discharged.

Potentially Responsible Parties (PRPs): Possible historic polluters who may eventually be held liable under CERCLA for the contamination or misuse of a particular property or resource.

Principal threat wastes: Those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur.

Proposed Plan: A document that summarizes the cleanup alternatives evaluated as part of the Feasibility Study process and identifies the preferred cleanup alternative.

Remedial Action Objectives: The cleanup goals established by EPA when implementing a remedial action.

Remedial Investigation: The CERCLA process of determining the nature and extent of hazardous material contamination at a site.

Record of Decision: The document that formalizes EPA's decision to implement a specific remedial action.

Soil Vapor Extraction: A technology that removes contaminants from the subsurface by extracting and treating contaminant vapors.

Superfund: The common name for the process established by CERCLA to investigate and clean up abandoned or uncontrolled hazardous waste sites.

Vadose Zone: The zone between land surface and the water table within which the moisture content is less than saturation and pressure is less than atmospheric. Soil pore space also typically contains air or other gases. The capillary fringe is included in the vadose zone. It is the porous material just above the water table which may hold water by capillarity (a property of surface tension that draws water upwards) in the smaller void spaces.

Vapor Intrusion: The process by which contaminant vapors in the soil and/or groundwater migrate through subsurface soils and enter overlying buildings.

Volatile Organic Compounds: Carbon-containing chemical compounds that evaporate readily at room temperature.

Wellhead Treatment: A treatment unit attached to the topmost point of a well that removes contaminants from the water before it goes to its end use.

Omega Chemical Corporation Superfund Site

EPA Requests Public Comment on Proposed Plan for OU-2 Groundwater Contamination

Site Information Repository

EPA maintains site information repositories for the Omega Site at the Whittier Public Library and at the EPA Superfund Records Center in San Francisco. These repositories contain the Administrative Record file, project documents, fact sheets and reference materials. EPA encourages you to review these documents to gain a complete understanding of the site. Locations of information repositories are listed below. EPA also has a site information web page at **www.epa.gov/region09/OmegaChemical**

Whittier Public Library
7344 S. Washington Avenue
Whittier, CA 90602
(562) 464-3450
Contact: Raye Beverage, Reference

U.S. EPA Superfund Records Center
95 Hawthorne Street, 4th floor
San Francisco, CA 94105
(415) 536-2000

Printed on 30% Postconsumer Recycled/Recyclable Paper

U.S. EPA Contacts

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Attn: Jackie Lane (Omega 8/10)

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