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Remedial Response

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Superfund Record of Decision:

Newmark Groundwater Contamination, CA

50272-101

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PB94-964516

16. Abstract (Limit: 200 words)

The Newmark Groundwater Contamination site is a 5-mile area of ground water contamination in San Bernardino, California. Land use in the area is predominantly residential and commercial, with a small amount of industrial use. The 110-square mile aquifer, known as the Bunker Hill Basin, is bounded by the San Bernardino and San Gabriel mountains to the north, the Crafton Hills and badlands to the southeast, and a hydrogeologic barrier formed by the San Jacinto fault to the southwest. Water flowing from all parts of the aquifer joins in a confined "artesian zone" before leaving the basin, where the Santa Ana crosses the San Jacinto Fault Line. Most of the western part of the basin is an unconfined aquifer with no substantial barriers to infiltration from the surface. The estimated half-million residents in nearby communities use an aquitard contained in the south central portion of the basin to obtain their drinking water supply. In 1980, State monitoring studies identified contamination by VOCs, including TCE and PCE, in large portions of ground water in the Bunker Hill Basin. Fourteen wells, which supply approximately 25% of the city of San Bernardino's drinking water supply, also were found to be contaminated above State and Federal levels. Following regional and State investigations, the State constructed four water treatment systems to protect the water supply, but after years of testing it became apparent that

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - Newmark Groundwater Contamination, CA
First Remedial Action
Contaminated Medium: gw
Key Contaminants: VOCs (1,2-DCE, PCE, TCE)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 38
	20. Security Class (This Page) None	22. Price

(See ANSI-Z39.18) *See Instructions on Reverse* OPTIONAL FORM 272 (4-77) (Formerly NTIS-35) Department of Commerce

Abstract (Continued)

the solvents still continued to flow southward, threatening other neighboring communities. In 1986 and 1989, after several State investigations suggested that the widespread contamination had resulted from numerous, unidentified sources; several plumes were identified in the Basin, including an eastern Newmark plume and the western Muscoy plume. In 1990, aerial photographs taken as part of EPA investigations, along with reports of witnesses, suggested that the primary source of contamination was the result of intermittent, improper disposal activities from the 1950s to 1970s at a solvent disposal pit (cat pit) located at the former site of the San Bernardino airport, near the Newmark wellfield. However, this could not explain the fact that the solvents also were found in wells scattered throughout the west side of the Shandin Hills, so EPA and the State now believe that the contamination is not from a single source. Additionally, at one point, EPA thought the Newmark and Muscoy plumes were distinct, but additional well drilling in 1992 confirmed that ground water flows from the west to east through a previously undiscovered channel. Based on this information obtained during the RI, the San Bernardino plume is no longer suspected to be the source of the contamination, and it is now believed that the principle contaminant source stems from the northwest side of the Shandin Hills, and most likely contributes to both plumes. Although the actual contamination source has not been identified yet, several possible sources in the area that currently are under investigation include Camp Ono, a former army base; an inactive county landfill; and an area of industrial development. This ROD addresses an interim remedy for the area of ground water contamination north and east of the Shandin Hills, as the Newmark OU. A separate action will address the ground water contamination west of the Shandin Hills, as the Muscoy OU. The primary contaminants of concern affecting the ground water are VOCs, including 1,2-DCE, PCE, and TCE.

The selected remedial action for this site includes extracting and treating contaminated ground water onsite, using either granular activated carbon (GAC) filtration, an innovative modification of liquid phase GAC, known as advanced oxidation, or air stripping, with vapor phase GAC to control air emissions, as determined during the RD stage; piping the treated water to the public water supply system for distribution; providing for a contingent remedy to recharge the treated water into the aquifer through reinjection, if the public water supply does not accept all or any of the treated water; and monitoring ground water. The estimated present worth cost for this remedial action is $49,900,000, which includes an unspecified O&M cost for 33 years.

PERFORMANCE STANDARDS OR GOALS:

Ground water cleanup goals are based on the more stringent of State standards or SDWA MCLs, and are expected to be met in the final action for this site.

NEWMARK OPERABLE UNIT

RECORD OF DECISION

PART I: DECLARATION

PART II: DECISION SUMMARY

PART III: RESPONSIVENESS SUMMARY

NEWMARK GROUNDWATER CONTAMINATION SUPERFUND SITE

SAN BERNARDINO, CALIFORNIA

United States Environmental Protection Agency
Region 9 - San Francisco, California

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RECORD OF DECISION

NEWMARK OPERABLE UNIT INTERIM REMEDY

PART I. DECLARATION

SITE NAME AND LOCATION

Newmark Groundwater Contamination Superfund Site
Newmark Operable Unit
San Bernardino, California

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Newmark Operable Unit, Newmark Groundwater Contamination Superfund site, chosen in accordance with CERCLA as amended by SARA and, to the extent practicable, the National Contingency Plan. This decision is based on the administrative record for this operable unit.

In a letter to EPA dated July 29, 1993 the State of California concurred with the selected remedy for the Newmark OU.

ASSESSMENT OF THE SITE

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

DESCRIPTION OF THE REMEDY

EPA has selected an interim remedy for the Newmark plume of groundwater contamination in the Newmark Groundwater Contamination Superfund Site. This portion of the site cleanup is referred to as the Newmark Operable Unit (OU). The Newmark OU is an interim action focusing on contamination in the underground water supply in the Bunker Hill Basin of San Bernardino, north and east of the Shandin Hills (Figures 1 and 2). The portion of the groundwater contamination west of the Shandin Hills, called the Muscoy OU, will be addressed in a separate action. An OU is a discrete action that comprises an incremental step toward comprehensively addressing Superfund site problems. The remedy and all of the alternatives presented in the feasibility study were developed to meet the following specific objectives for the Newmark OU:

- To inhibit migration of groundwater contamination into clean portions of the aquifer;
- To limit additional contamination from continuing to flow into the Newmark OU plume area;

- To begin to remove contaminants from the groundwater plume for eventual restoration of the aquifer to beneficial uses (This is a long-term project objective rather than an immediate objective of the interim action.)

The remedy involves groundwater extraction (pumping) and treatment of 8,000 gallons per minute (gpm) in the vicinity of 14th Street, between Arrowhead and Waterman Avenues, at the leading edge of the contaminant plume, and an additional 4,000 gpm at the Newmark wellfield (near 48th Street and Little Mountain Drive) where the contamination enters the eastern part of the valley (Fig. 2). The exact number, location and other design specifics of new extraction wells will be determined during the remedial design phase of the project to inhibit the migration of the contaminant plume most effectively.

All the extracted contaminated groundwater shall be treated to remove VOCs by either of two proven treatment technologies: **granular activated carbon (GAC) filtration or air stripping.** EPA determined during the Feasibility Study (March 1993) that these treatment technologies are equally effective at removing VOCs and are similar in cost at this OU. Both technologies have been proven to be reliable in similar applications. It is acceptable to use one technology for the northern (Newmark wellfield) facility and the other at the southern treatment facility. As a result of comments received during the public comment period, EPA may use a modification of liquid phase GAC (Advanced Oxidation pretreatment) if this modification proves to be effective and economical during design phase testing and analysis. The VOC treatment technology which best meets the objectives of the remedy for the Newmark OU will be determined during the remedial design phase, when more detailed information is available to assess effectiveness and cost.

After treatment, the water shall meet drinking water standards (maximum contaminant levels or MCLs) for VOCs. If air stripping treatment is selected, air emissions shall be treated using the best available control technology (e.g., vapor phase GAC) to ensure that all air emissions meet applicable or relevant and appropriate requirements.

The treated water will be piped to the public water supply system for distribution. Groundwater monitoring wells will be installed and sampled regularly to help evaluate the effectiveness of the remedy.

If the public water supply system does not accept any or all of the treated water (possibly due to water supply needs), any remaining portion of water will be recharged into the aquifer via reinjection wells near the edge of the plume. The number, location and design of the reinjection wells will be determined during the remedial design phase to best meet the objectives of the remedy and meet applicable or relevant and appropriate requirements.

The total duration of the Newmark OU interim remedy will be 33 years, with the first three years for design and construction. EPA will review this action every five years throughout this interim remedy period and again at the conclusion of this period.

The remedial action for the Newmark OU represents a discrete element in the overall long-term remediation of groundwater at the Newmark Groundwater Contamination Superfund Site. The objectives of this interim action (i.e. inhibiting migration of groundwater contamination to clean portions of the aquifer, controlling additional contamination from entering this portion of the aquifer, and beginning to remove contaminant mass from the aquifer in the Newmark Plume) would not be inconsistent with nor preclude implementation of any final, overall remedial action or actions selected by EPA in the future for the Newmark Groundwater Contamination Superfund Project.

EPA is the lead agency for this project and the Department of Toxic Substances Control of the State of California Environmental Protection Agency is the support agency.

DECLARATION

This interim action is protective of human health and the environment, complies with Federal and State applicable or relevant and appropriate requirements directly associated with this action and is cost effective. This action utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable, given the limited scope of the action. Because this action does not constitute the final remedy for the site, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element will be addressed at the time of the final response action. Subsequent actions are planned to fully address the principal threats at these sites.

Because this remedy will result in hazardous substances remaining on-site above health-based levels, EPA shall conduct a review, pursuant to CERCLA Section 121, 42 U.S.C. Section 9621, at least once every five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

for Harry Seraydarian

John C. Wise
Acting Regional Administrator

8/4/93
Date

PART II. DECISION SUMMARY

This Decision Summary provides an overview of the Newmark OU interim remedy, including a description of the nature and extent of contamination to be addressed, and the remedial alternatives, the comparative analysis of the remedial alternatives, a description of the selected remedy and the rationale for remedy selection.

1.0 SITE LOCATION AND DESCRIPTION

The Newmark OU is located within the Bunker Hill Basin (also known as the Upper Santa Ana River Basin) in San Bernardino, California. The following sections present a basin description, regulatory history, and a summary of the Remedial Investigation and Feasibility Study (RI/FS) activities within the Newmark Superfund Site.

1.1 Description of the Bunker Hill Basin

The Newmark Groundwater Contamination affects a large portion of a 110 square mile aquifer in the San Bernardino Valley of southern California. (Figure 1). The aquifer, known as the Bunker Hill Basin, is bounded by the San Bernardino and San Gabriel Mountains to the north, the Crafton Hills and badlands on the southeast, and by a hydrogeologic barrier formed by the San Jacinto fault along the southwest. (Figure 2) Water flowing from all parts of the aquifer join in a confined 'artesian zone' before leaving the basin where the Santa Ana River crosses the San Jacinto faultline.

Coarse erosional material (alluvial and river channel deposits) have accumulated in the this area of the basin to depths of 400 to over 1900 feet, atop older formations that act as barriers to further vertical movement. A fold in one of these impermeable bottom formations forms the Shandin Hills (formerly called Bunker Hill in reference to military emplacements from the WWII era), which force groundwater flowing from the north and west to flow around either side rather than directly south toward the Santa Ana River.

Most of the western portion of the basin is an unconfined aquifer, with no substantial barriers to infiltration from the surface. In the lowest area of the basin (the south-central portion around the Santa Ana River), several extensive clay layers have formed an aquitard, overlying and capping the water-bearing sand and gravel aquifers. This confined portion of the aquifer produces tremendous supplies of water for nearby communities.

The aquifer receives rainfall and natural runoff from the surrounding mountains, collected floodwaters from rivers, creeks and washes, and water imported from outside the region that is spread over percolation basins. According to the San Bernardino Municipal Water District, the Bunker Hill Basin is capable of storing approximately 5 million acre-feet (1.6 trillion gallons)

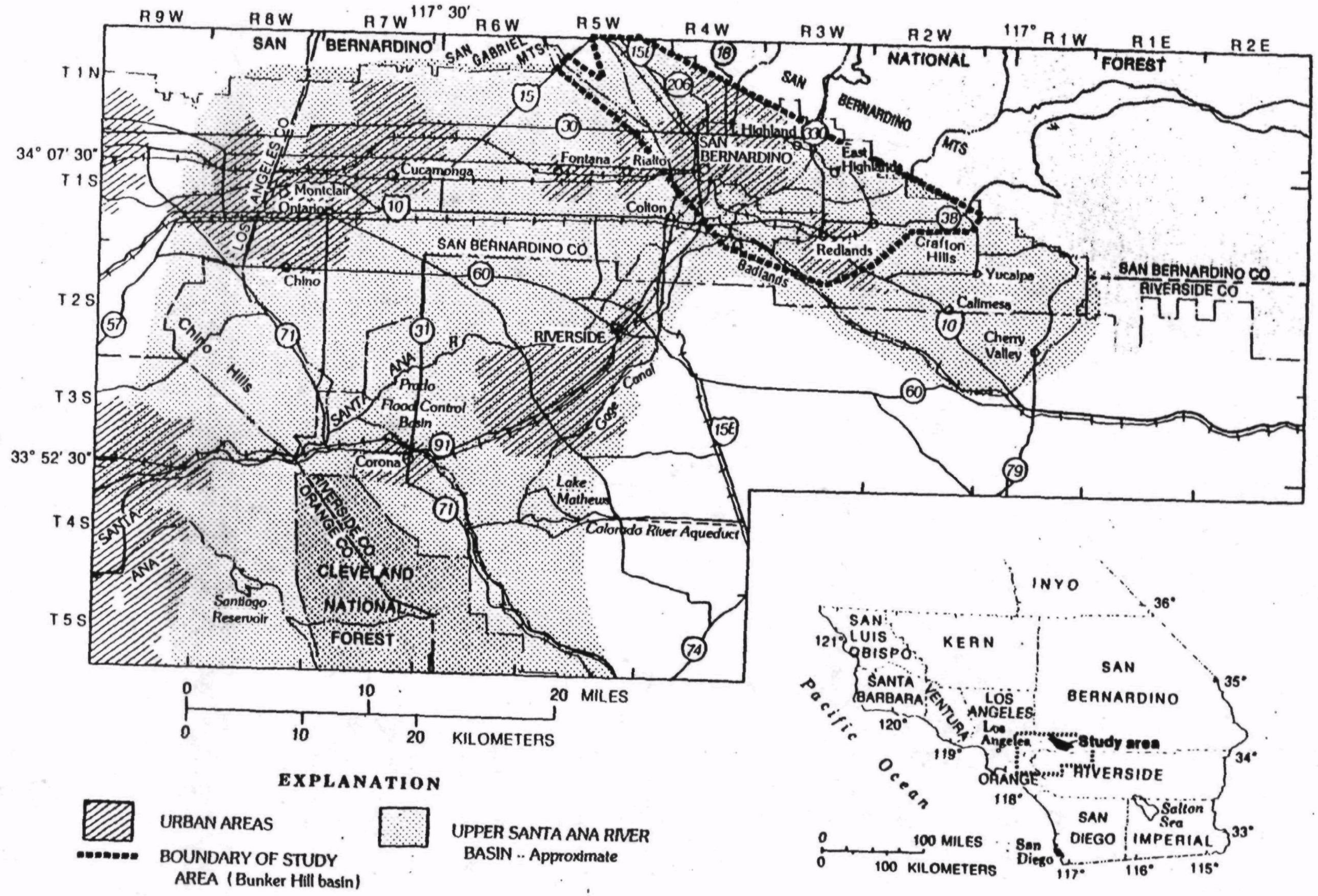

FIGURE 1. Location of study area.

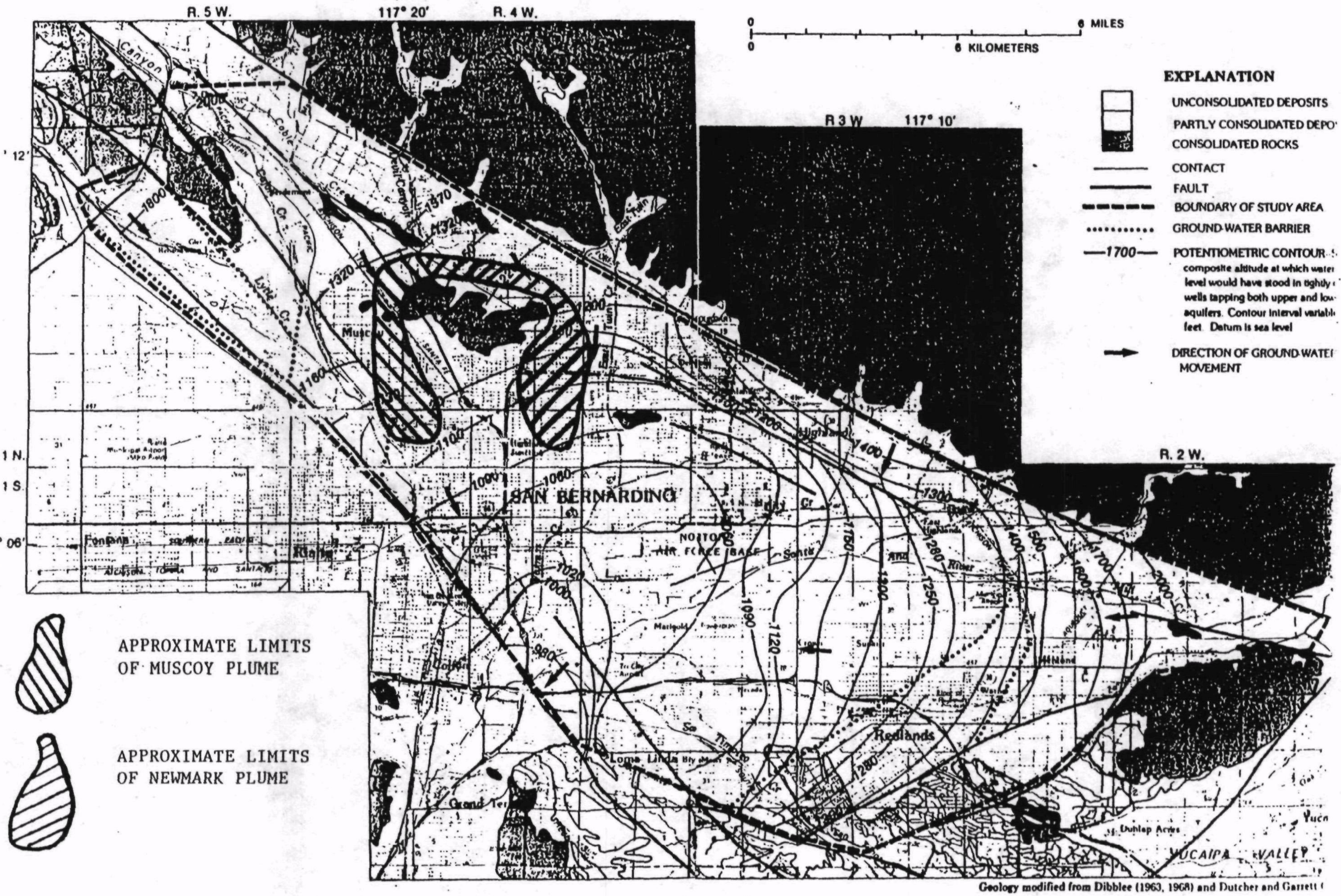

FIGURE 2. Altitude of potentiometric surface and direction of ground-water movement, summer 1986.

and producing 250,000 acre-feet (81 billion gallons) each year. Nearly a half-million residents of San Bernardino, Riverside and surrounding communities rely on this portion of the aquifer for at least part of their water supply.

The Newmark OU lies almost entirely within the city of San Bernardino. Residential and commercial use predominates throughout the OU, although some industrial development has been identified. Very little of the area remains undeveloped.

1.2 Description and Background of the Newmark OU

The solvents (tetrachloroethene, PCE, and trichloroethene, TCE) spreading from the Newmark Superfund site threaten approximately one-half of the Bunker Hill Basin.

The EPA placed the Newmark site on the National Priorities List (NPL) in March, 1989. At that time, EPA believed the eastern (Newmark) plume of contamination to be completely separate from the western (Muscoy) groundwater contamination. Results of earlier investigations identified a possible contaminant source (a disposal pit for waste liquids at a former airport) near the Newmark wellfield.

The EPA Remedial Investigation (RI) began in late 1990. In 1992 eight sets of monitoring wells were drilled and sampled in the Newmark OU, and nearby city and state wells were also sampled by EPA. PCE and TCE were the most prevalent contaminants in all the contaminated wells. Other VOCs have also been detected in trace quantities. Results from the RI showed that the originally suspected source of the Newmark plume was not currently a source of contamination. Additional well drilling in the summer of 1992 traced groundwater contamination through a previously undiscovered underground channel flowing from the western (Muscoy) side of the valley. The Newmark site was officially expanded in September, 1992 to include the Muscoy plume. EPA began additional RI studies for the Muscoy plume and finished a feasibility study (FS) for the Newmark OU which evaluated a range of cleanup alternatives for addressing the five mile long contaminated groundwater plume. The RI/FS report for the Newmark OU was finalized in March, 1993.

2.0 <u>SITE HISTORY</u>

In 1980, the California Department of Health Services (DHS) initiated a monitoring program in San Bernardino to test for the presence of industrial chemicals in the water from public supply wells. The results of initial tests and of subsequent testing revealed the presence of PCE and TCE contamination in large portions of the groundwater of the Bunker Hill Basin.

Fourteen wells operated by the city of San Bernardino Water Department in the North San Bernardino / Muscoy area were found to contain concentrations of PCE and TCE above the state and federal MCLs of 5 parts per billion (ppb) for both TCE and PCE. The solvents were found in wells scattered around the north, east and west sides of the Shandin Hills. (Figure 3) The affected wells had supplied nearly 25 percent of the water for the city of San Bernardino. As of 1993, a total of thirteen public water supply wells have been contaminated by the solvents apparently spreading from the Newmark plume, and seven water supply wells have been affected in the area of the Muscoy plume.

Following investigations by the Santa Ana Regional Water Quality Control Board and California Department of Health Services (now the California EPA Department of Toxic Substances Control), the state provided over $6 million to construct three water treatment systems, with a fourth under construction, to protect the public water supply. After years of testing it became apparent that the solvents in the groundwater were continuing to flow south, threatening many more wells operated by San Bernardino, Riverside and other communities. The state requested federal involvement to address this regional problem.

It should be noted that the cities of San Bernardino, Riverside and other water agencies in the area closely monitor the quality of drinking water delivered to residents. The water served to residents meets all Federal and state drinking water requirements.

The state investigations published in 1986 and 1989 both suggested that the widespread contamination in northern San Bernardino probably resulted from numerous small, unidentified sources. The Shandin Hills and nearby hill formations were assumed to separate the eastern (Newmark area) aquifer from the western (Muscoy area) aquifer, making it unlikely that all 14 wells could have been contaminated from a single source.

Continued monitoring of existing water supply wells and monitoring wells constructed by the state established a record of contamination relatively uniform in composition and concentration throughout the area north and east of the Shandin Hills. This pattern strongly suggested a single plume in this area.

Aerial photographic analysis was completed by EPA's Environmental Monitoring Systems Laboratory in September, 1990. This analysis, along with interviews of witnesses, suggested that the primary source of contamination was a suspected solvent disposal pit ('cat pit') on the former site of the private San Bernardino Airport. This activity occurred from the late 1950's intermittently through the early 1970's. Several minor activities in different parts of the airport site were also identified as potential waste releases. No other sources could be identified between the disposal site and the closest uncontaminated wells upgradient. The plume from this single source would extend over four miles. The waste disposal pit was also within several hundred feet of the Newmark wellfield (four City of San Bernardino Water Department wells). These wells exhibited the highest concentration of contaminants measured in any wells in the area, nearly 200 $\mu g/l$ (parts per billion) of PCE.

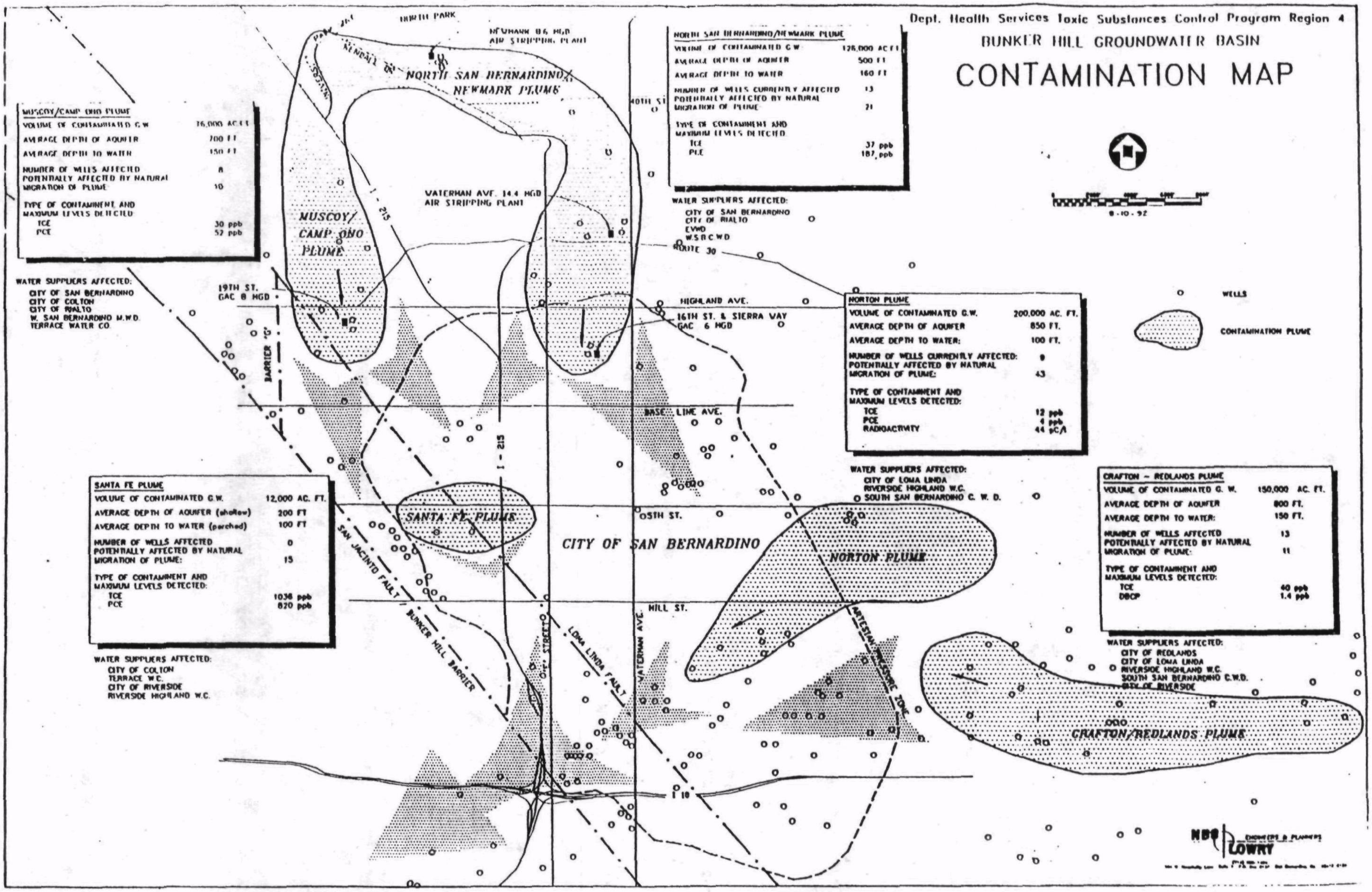

FIGURE 3: LOCATION OF PUBLIC WATER SUPPLY WELLS AND IDENTIFIED CONTAMINANT PLUMES IN THE BUNKER HILL GROUNDWATER BASIN

In 1984-85, the area near the "cat pit", which was later identified as the probable contaminant source, was developed into a residential community.

Based on information obtained during the Remedial Investigation, the San Bernardino Airport site is no longer suspected to be the source of the Newmark Plume. It is now believed that the principle source (or sources) lies on the west side of the Shandin Hills and likely contributes to both the Newmark and Muscoy Plumes.

While ongoing investigations attempt to identify the source, EPA determined that the Newmark plume could be addressed as an interim action (the Newmark OU).

3.0 ENFORCEMENT ACTIVITIES

The results of the Remedial Investigation and other investigations undertaken by EPA and state agencies indicate that the project lead for the Newmark OU will remain with EPA until a probable source is located.

Considerable effort was expended on a PRP search while the San Bernardino Airport site was suspected to be the source of the contamination. Results of the Remedial Investigation traced the source more than one mile upgradient of the suspected source. No residual contamination was found in the unsaturated zone or the upper portion of the aquifer immediately beneath former disposal pits. The airport site is no longer considered a likely source of the contamination.

The focus of the ongoing PRP search will be potential sources located to the northwest of the Shandin Hills. These potential sources include Camp Ono (a WWII-era army base decommissioned in 1947 and subsequently developed for residential and commercial/industrial use), a closed county landfill, and an area of industrial development. The Department of Defense was sent a copy of the Newmark Proposed Plan at the start of the public comment period, along with an information request letter concerning the operations at the former Camp Ono.

4.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

EPA's preferred alternative, as well as four other alternatives were described in EPA's Proposed Plan for the Newmark OU (March 1993). The Proposed Plan was in the form of a fact sheet and was distributed to all parties on EPA's mailing list for the Newmark project. The original 30 day public comment period was extended to 6 weeks (45 days) after EPA received requests for extensions from members of the public. The public comment period closed on May 5, 1993. EPA received approximately 50 comments. These comments and EPA's responses to these comments are summarized in Part III (the Responsiveness Summary) of this ROD.

A press release to announce the release of the Proposed Plan was issued March 17, 1993. Notice of the public meeting as well as the availability of the Proposed Plan was published in the Inland Empire Sun on March 18, 1993. In addition, several newspaper articles were written about the remedial investigation, the feasibility study and the Proposed Plan for the Newmark OU including: Inland Empire Sun - March 18, 1993; Riverside Press-Enterprise - March 18, 1993. A map of the Newmark OU was provided in the Proposed Plan and the various newspaper articles published maps and described the area that would be impacted by the Newmark OU.

A public meeting was held in the City of San Bernardino Council Chambers on April 14, 1993, to discuss EPA's preferred alternative and the other alternatives. At this meeting EPA gave a brief presentation regarding the Proposed Plan, answered questions, and accepted comments from members of the public. This meeting was broadcast live on the local cable channel.

EPA expended considerable effort developing strong community relations. A Technical Advisory Committee has been successful in maintaining close communication with local and state agencies. For communication with the local community, three principle mechanisms have been employed: formal presentations (open houses, meetings with organizations and fact sheet distribution), contact with the print and electronic media and informal discussions with home-owners' associations and individuals.

The San Bernardino and Riverside papers have published a number of positive and well-researched articles about the project. Major television networks broadcast reports of the drilling operation in February, 1992. The Project Manager participated in a 90 minute call-in talk show on the public television station in August, 1992.

Invitations were accepted to speak at a city-wide Neighborhood Watch meeting and at a San Bernardino "town-hall" meeting sponsored by the California Water Education Foundation. Two open house meetings were held to introduce the field work in February, 1992, and another open house was held on-site for the community and press shortly after drilling began. Three fact sheets in addition to the Proposed Plan have been distributed.

Three different home-owners' associations accepted EPA's offer for informal discussions of the project. Drilling around these communities was greatly facilitated by open communication. Presentations were made to the staff and teachers at a local school, and the Project Manager taught the 5th grade class about groundwater and chemical pollution as it relates to the Newmark site.

5.0 SCOPE AND ROLE OF THE OPERABLE UNIT

The interim remedial action for the Newmark OU represents a discrete element in the overall long-term remediation of groundwater in the San Bernardino area. Since the source has not been identified, the final overall plan for the remediation of the entire Newmark Groundwater Contamination Site has not yet been determined. The Newmark plume constitutes a major portion of the contaminated aquifer and this remedy will be a significant step toward eventual remediation. EPA does not expect these objectives to be inconsistent with, nor preclude, any final action for the entire site.

The objectives of the Newmark OU are:

- To inhibit migration of groundwater contamination into clean portions of the aquifer;
- To limit additional contamination from continuing to flow into the Newmark OU plume area;
- To begin to remove contaminants from the groundwater plume for eventual restoration of the aquifer to beneficial uses (This is a long-term project objective rather than an immediate objective of the interim action.)

The analysis of the no-action option indicates that unless this action is implemented, the contamination will continue to spread to clean areas of the aquifer which are currently used as important sources of drinking water.

EPA is currently using the results of the Newmark OU remedial investigation in basinwide feasibility studies to address VOC contamination in the Muscoy OU and to investigate potential sources. As part of the Muscoy OU FS, EPA is revising and recalibrating the groundwater flow model for the entire site to incorporate the most recent data. When sufficient information is available on the contaminant source and transport from the source, EPA will review and evaluate various groundwater remediation options for the complete site. It is expected that the Newmark OU remedy will constitute an integral part of the complete remedy.

EPA will continue to monitor aquifer behavior and contaminant transport as part of this interim action. The information gathered will be important in the analysis of a remedy for the entire Newmark site.

6.0 SUMMARY OF NEWMARK OU SITE CHARACTERISTICS

Results of EPA's Remedial Investigation provided critical understanding in three general areas: groundwater flow characteristics, contaminant identification and concentration, and potential for exposure through the unsaturated zone.

The result that was least expected was that a significant flow of contaminated groundwater was entering the eastern (Newmark OU) side of the basin from the western portion (Muscoy OU). Most recharge to the Newmark OU part of the Bunker Hill Basin does originate along the San Bernardino Mountains to the north, and this source is not contaminated. Another important observation was that clay or silt layers that would inhibit vertical contaminant migration were not present in the monitoring well drilled near the leading edge of the plume. The contaminants cannot be expected to remain in an isolated vertical layer. A groundwater flow model was successfully developed to describe the aquifer behavior.

The contaminants identified were predominantly chlorinated solvents. Tetrachloroethene (PCE) was found in all contaminated wells at concentrations less than 40 parts per billion (ppb). Trichloroethene (TCE) was the next most common contaminant, and never exceeded 10 ppb. Other related solvents were identified at concentrations below drinking water standards. Chlorofluorocarbons (freons) were also observed. Monitoring wells were constructed to collect samples at two or more depths at each well location. Generally, the highest concentrations of contaminants were found in the deeper wells. Typically, a well near bedrock (about 500 feet deep) would have PCE levels of 10 to 20 ppb while the well in the upper part of the aquifer would have PCE less than 2 ppb. Monitoring well data compared quite closely with data from nearby water production wells.

Subsurface soil samples at the originally suspected source had no detectable levels of contaminants. Air samples from homes directly above the contaminant plume had no more volatile chemicals than samples from homes outside the plume area. Levels were not different from values observed in homes throughout the Los Angeles metropolitan area. These results confirmed that volatilization from the subsurface does not provide a measurable exposure pathway.

7.0 SUMMARY OF SITE RISKS

Baseline risk assessments are conducted at Superfund sites to fulfill one of the requirements of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The NCP (40 CFR Part 300) requires development of a baseline risk assessment at sites listed on the National Priorities List (NPL) under CERCLA. The CERCLA process for baseline risk assessments is intended to address both human health and the environment. However, due to the nature of the contamination at the site and the highly urbanized setting of the Newmark OU, the focus of the baseline risk assessment was on human health issues, rather than environmental issues.

The objective of the baseline risk assessment for the Newmark OU was to evaluate the human health and environmental risks posed by the contaminated groundwater if it were to be used as a source of drinking water without treatment. The baseline risk assessment incorporated the water quality information generated during the RI field investigation and sampling program to estimate current and future human health and environmental risks.

The risk assessment was conducted in accordance with EPA guidance including: Guidance for Conducting Remedial Investigation and Feasibility Studies under CERCLA (USEPA, 1988), Risk Assessment Guidance for Superfund, Vol. I Health Evaluation Manual (Part A) and Vol. 2 Ecological Assessment (USEPA, 1989), The Exposure Factors Handbook (USEPA, 1989), and Risk Assessment Guidance for Superfund Human Health Risk Assessment, USEPA Region IX Recommendations (USEPA, 1989).

A risk assessment involves the qualitative and quantitative characterization of potential health effects of specific chemicals on individuals or populations. The risk assessment process comprises four basic steps: 1) hazard identification, 2) dose-response assessment, 3) exposure assessment, and 4) risk characterization. The purpose of each element is as follows:

- Hazard identification characterizes the potential threat to human health and the environment posed by the detected constituents.
- Dose response assessment critically examines the toxicological data used to determine the relationship between the experimentally administered animal dose and the predicted response (e.g., cancer incidence) in a receptor.
- Exposure assessment estimates the magnitude, frequency, and duration of human exposures to chemicals.
- Risk characterization estimates the incidence of or potential for an adverse health or environmental effect under the conditions of exposure defined in the exposure assessment.

Human Health Risk Assessment

Risk assessments estimate the possibility that additional occurrences of cancer will result from exposure to contamination. The background probability of developing cancer from all causes in California is approximately one in four (or 250,000 in a million). An excess cancer risk of 1 in a million means that a person exposed to a certain level of contamination would increase the risk of developing cancer from 250,000 in a million to 250,001 in a million as a result of the exposure. EPA considers excess cancer risks greater than 100 in a million to be unacceptable.

In preparing risk assessments, EPA uses very conservative assumptions that weigh in favor of protecting public health. For example, EPA may assume that individuals consume two liters of drinking water from wells situated within a contaminant plume every day for a 30-year period, even though typical exposure to the chemical would be far less.

EPA included two potential exposure routes (ways the contamination gets into the body) in the risk assessment:

- drinking the groundwater during residential use; and
- inhaling the chemicals in groundwater as vapors during showering.

Skin contact with contaminated water was also considered but EPA found that it didn't pose a significant risk. Results of the RI indicated that direct exposure to volatile organic compounds (VOCs) from the soil or water 100 feet below ground was insignificant at this site.

Chemicals of potential concern in the Newmark OU used in the risk assessment calculations included: PCE, TCE, cis 1,2-dichloroethene (DCE), and six other VOCs detected in at least one well. EPA will continue to monitor the groundwater in the Newmark OU for any changes that would affect the risk analysis.

The results of the risk assessment indicated that the current contaminant levels in the aquifer of the Newmark OU would not meet state or Federal drinking water standards if this water were to be delivered directly to local residents, without being treated. However, the levels are currently below the concentrations that would pose an unacceptable risk to human health, as defined by CERCLA. If the groundwater were used as a drinking water source without treatment, the chance of developing cancer during a lifetime would increase by as much as 20 in a million. EPA is taking an action at the Newmark OU in order to meet the drinking water standards (MCLs) even though the risk levels do not exceed 100 in a million.

The baseline risk assessment for the Newmark OU is presented in the <u>Remedial Investigation and Feasibility Study Report for the Newmark OU</u> (March 1993).

<u>Environmental Risk Assessment</u>

Given the present developed condition of the site and the major exposure pathway consideration of contaminated groundwater, there was no expectation for significant impact to potential environmental receptors. Urbanization has already replaced habitat potential; therefore, no significant number of receptors appeared to be present. There appeared to be no apparent mechanism for exposure to environmental receptors from contaminated groundwater. Also, there was no indication that future site plans would reinstate habitat and thereby recreate a potential for environmental receptors in the future.

8.0 DESCRIPTION OF ALTERNATIVES

Development of Alternatives to Meet Project Objectives

Before developing a range of cleanup alternatives for evaluation, EPA identified the objectives of the interim cleanup for the Newmark OU. All of the alternatives were screened for: 1) effectiveness at protecting public health and the environment, 2) technical feasibility (implementability), and 3) cost. In addition, the alternatives were developed to meet the specific cleanup objectives for the Newmark OU described previously.

Summary of Cleanup Alternatives

Based on the results of the RI, EPA identified five cleanup alternatives for addressing groundwater contamination of the Newmark OU. Detailed descriptions of these alternatives are provided in the Newmark OU RI/FS Report (March 1993). Rather than including all potential combinations of extraction locations and amounts, the initial screening process identified the most efficient extraction scenario that would meet the stated objectives. The five alternatives were evaluated based on nine specific criteria: 1) Overall Protection of Human Health and the Environment, 2) Compliance with Applicable or Relevant and Appropriate Requirements (ARARs), 3) Long-term Effectiveness and Permanence, 4) Reduction of Toxicity, Mobility or Volume through Treatment, 5) Short-term Effectiveness, 6) Implementability, 7) Cost, 8) State Acceptance, and 9) Community Acceptance.

With the exception of the **Alternative 1 - No Action**, all of the alternatives involve the extraction of 4,000 gallons per minute (gpm) of groundwater near the Newmark wellfield and 8,000 gpm of groundwater near the leading edge of the plume (approximately at 14th Street between Arrowhead and Waterman Avenues) for a period of 30 years. Individual wells would pump from 800 to 2,000 gpm, the range for a typical city drinking water well.

A computer model was used to determine that these extraction rates would result in effective inhibition of plume migration and optimal contamination removal for this interim action. With the exception of **Alternative 1 - No Action**, all of the alternatives would involve the construction and operation of a VOC treatment system, construction and sampling of additional monitoring wells, and analysis of any changes in the current operations of nearby public water supply wells.

During the first three years after the ROD is signed, the remedy would go through the remedial design and initial implementation stages. EPA must plan, build the equipment and test it to make sure it functions properly.

ALTERNATIVE 1: No Action

This alternative serves as a baseline to compare other alternatives. This alternative is evaluated to determine the risks that would be posed to public health and the environment if no action were taken to treat or contain the contamination. The **No Action Alternative** would involve only groundwater monitoring; no additional cleanup activities would be conducted. The cost of constructing the necessary monitoring wells and sampling them over 30 years would be approximately $3.5 million (present net worth).

ALTERNATIVE 2: Extract/Treat(Granular Activated Carbon)/Public Water System

Extraction

Alternative 2 involves the extraction of 8,000 gpm of contaminated groundwater placed at the leading edge of the Newmark plume and extraction of 4,000 gpm within the plume near the Newmark wellfield. The extraction wells would be located to inhibit most effectively the migration of the contaminant plume.

Treatment

The extracted groundwater would be transmitted via underground piping to Granular Activated Carbon (GAC) treatment plants (two separate treatment plants, one for each set of extraction wells). (Note that Alternative 3, involving treatment by air stripping, is considered by EPA to be equivalent to Alternative 2, and may be substituted for all or part of Alternative 2 during the design phase of the project.)

Final Use of Treated Water

The treated water would meet all legal requirements for drinking water and would be piped to the public supply system for distribution. Groundwater monitoring wells would be installed to evaluate the effectiveness of the remedial action. Following approximately 2 to 3 years for design and construction, this system would operate for 30 years. Operation of nearby public water supply wells is not expected to interfere with this remedy, although any significant changes in operations would be analyzed to determine the effect on this cleanup action. EPA will conduct a review of the project effectiveness every five years.

ALTERNATIVE 3: Extract/Treat(Air Stripping with Emission Control)/Public Water System

Alternative 3 involves the same extraction system, final distribution and monitoring design as Alternative 2. Alternative 3 differs from Alternative 2 in the treatment of the extracted groundwater to remove VOCs to meet drinking water standards. In Alternative 3, the extracted contaminated water would be treated by air stripping with emission control to meet the South Coast Air Quality Management District's requirement for best available control technology. Currently, vapor-phase granular activated carbon meets this requirement, and EPA used this technology for cost and effectiveness analysis. New emissions control technologies developed prior to the final design could be considered if they meet the air quality requirement. Air stripping is essentially equal to GAC (Alternative 2) in effectiveness, technical feasibility and the remaining criteria.

Alternative 4: Extract/Treat (Advanced Oxidation - Peroxide/Ozone)/ Public Water System

Alternative 4 involves the same extraction, end use and monitoring design as Alternative 2. The extracted water would be treated for VOCs using an advanced oxidation process that uses peroxide and ozone to destroy (oxidize) the contaminants (rather than transferring the contaminants to a carbon filter). The advanced oxidation process was the primary treatment method for this alternative. The treated water would meet all legal requirements for a drinking water supply and would be piped to a public distribution system. Groundwater monitoring wells would be installed to evaluate the effectiveness of the action.

ALTERNATIVE 5: Extract/Treat (GAC or Air Stripping)/Return to the Aquifer via Reinjection).

Alternative 5 involves the same extraction, treatment and monitoring designs as Alternative 2 (including the option to use either GAC or air stripping to treat the extracted water for VOCs). The water would be returned to the aquifer in reinjection wells downgradient from the extraction wells. The treated water would meet drinking water standards before being returned to the aquifer.

9.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

A comparative analysis of the alternatives against the nine evaluation criteria is presented in this section.

No Action versus the Nine Criteria. Clearly, Alternative 1 would not be effective in the short- and long-term in protecting human health and the environment as it does not provide for removing any contaminants from the aquifer, for inhibiting further downgradient contaminant plume migration, or for reducing the toxicity, mobility and volume of contaminants through treatment. Implementing the no-action alternative would be simple and inexpensive since it involves only groundwater monitoring. As indicated by the baseline risk assessment presented in the RI Report, Alternative 1 could pose both carcinogenic and non-carcinogenic risk if a person were exposed to the groundwater from the upper zone of the aquifer, although these risks are below the 100 in a million excess risk level (10^{-4}) which EPA considers generally unacceptable. The current contaminant level would not meet state or federal drinking water standards if this water were to be delivered directly to local residents without treatment. Loss of a valuable water resource from continued degradation of the aquifer is a major concern for the State and the public.

Overall Protection of Human Health and the Environment, Short Term Effectiveness and Long Term Effectiveness.

Alternatives 2, 3, 4 and 5 have the same effectiveness in the short and long term in reducing the risk to human health and the environment by removing contaminants from the aquifer; by inhibiting further downgradient contaminant migration; and by reducing the toxicity, mobility and volume of contaminants in the aquifer.

Reduction of Toxicity, Mobility and Volume through Treatment. The VOC treatment technologies used in Alternatives 2, 3 and 5 (either air stripping with emission control (e.g., vapor-phase GAC adsorption) or liquid phase GAC adsorption) are technically feasible and effective in meeting ARARs for VOCs in the extracted and treated groundwater. Treatment of the extracted contaminated groundwater via air stripping with vapor-phase GAC adsorption or liquid phase GAC adsorption would reduce substantially the toxicity and mobility of contaminants in the aqueous phase. The adsorption of contaminants onto the GAC would reduce the volume of contaminated media. However, a substantially larger quantity of contaminated GAC media would be generated with either air stripping with vapor-phase GAC or liquid-phase GAC systems compared to perozone oxidation (which is a destructive technology) followed by either air stripping with vapor-phase GAC adsorption or liquid-phase GAC. This contaminated GAC would require disposal or regeneration. During the design phase, an alternative emission control technology will be tested to eliminate the need for vapor-phase GAC while meeting the Best Available Control Technology requirement.

Treatment of the extracted contaminated groundwater via perozone oxidation in Alternative 4 would destroy greater than 90 percent of the VOCs, and generate a smaller quantity of contaminated GAC media compared to the conventional technologies alone. VOC treatment using perozone oxidation has only been tested and applied in pilot-scale/limited applications, and limited O&M data are available. Concern has been expressed over the reliability of this innovative technology at large-scale application for drinking water supply treatment. Incomplete oxidation can lead to the formation of by-products such as formaldehyde which would also need to addressed. Coupled with the uncertainties associated with design, capital and operational costs and day-to-day reliability at a large scale, and finally the fact that a municipality will be receiving this water, all combine to make Alternative 4 less preferable than Alternatives 2, 3 and 5 which propose using liquid phase GAC or air stripping for VOC treatment.

As a result of comments received during the public comment period, EPA further evaluated the use of an advanced oxidation system as pretreatment for liquid-phase GAC. Additional research on perozone use and revised cost estimates based on a bench scale treatability study can be found in the following technical memorandum: Analysis of "Hybrid" Advanced Oxidation Pretreatment/ Activated Carbon Alternative for the Newmark Operable Unit (June 25, 1993) included in the Administrative Record for the Newmark OU. Pretreatment with a destructive technology has the theoretical advantage of reducing contaminant mass while enhancing the operation of a reliable conventional technology. EPA may use this modification of liquid phase GAC if this modification proves to be effective and economical during design phase testing and analysis.

Compliance with ARARs. As discussed in the ARARs section (Section 10) of this ROD, since this remedial action is an interim action, there are no chemical-specific ARARs for aquifer cleanup for any of the alternatives. For Alternatives 2 through 5, the chemical-specific ARARs for the treated water from the VOC treatment plant at this site are Federal MCLs and more stringent State MCLs for VOCs. Alternatives 2, 3, and 5 are expected to meet these ARARs for the treated water. There is some uncertainty regarding the ability of Alternative 4 to meet these ARARs because perozone has not been used to treat such high concentrations of VOCs at such high flow rates. Therefore, there is the potential for not meeting MCLs unless the air stripping or liquid-phase GAC unit following the perozone system is a redundant treatment system (which would add substantially to the cost).

For the Alternatives that involve distribution of the treated water to a public water supply system (Alternatives 2, 3 and 4), secondary drinking water standards are ARARs. For water that will be served at the tap, all legal requirements will have to be met. In Alternative 5, the treated water will meet MCLs for VOCs prior to return to the aquifer at an on-site location.

Implementability. Technically and administratively, Alternatives 2, 3, and 5 could be implemented. The technologies considered for groundwater monitoring, extraction, and conveyance are proven and have been applied extensively. For Alternative 5, the availability of an appropriate on-site location for reinjection of extracted and treated groundwater would need to be addressed.

State and Public Acceptance. Based on comments received during the public comment period, the public generally expressed support for Alternatives 2 through 5, although strong reservations were expressed about alternative 4. EPA received comments from the City of San Bernardino Water Department, two other water agencies in the area, and members of the San Bernardino community specifically in support of Alternatives 2 and 3. Comments received during the public comment period along with EPA responses are presented in Part III of this ROD, the Responsiveness Summary. In a letter dated July 29, 1993, the State (Cal-EPA) concurred with EPA's selected remedy for the Newmark OU.

Cost. The estimated total present worth of Alternatives 2, 3 and 5 ranges from $47,900,000 to $49,900,000. The total present worth cost for Alternative 4 is $61,000,000. For alternatives 2, 3 and 4, some of these costs are expected to be offset by the water supply agencies which accept the treated water. These overall project costs do not take into account the value of utilizing the groundwater resource directly as opposed to recharging the water to the aquifer to be eventually pumped to the surface again prior to use (Alternative 5).

10.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

This section discusses Applicable or Relevant and Appropriate requirements (ARARs) for the Newmark OU. Under Section 121(d)(1) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 as amended by the Superfund Amendments and Reauthorization Act of 1986 (collectively, CERCLA), 42 U.S.C. § 9621(d) remedial actions must attain a level or standard of control of hazardous substances which complies with ARARs of Federal environmental laws and more stringent state environmental and facility siting laws. Only state requirements that are more stringent than Federal ARARs, and are legally enforceable and consistently enforced may be ARARs.

Pursuant to Section 121(d) of CERCLA, the on-site portion of a remedial action selected for a Superfund site must comply with all ARARs. Any portion of a remedial action which takes place off-site must comply with all laws legally applicable at the time of the off-site activity occurs, both administrative and substantive.

An ARAR may be either "applicable", or "relevant and appropriate", but not both. According to the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 CFR Part 300), "applicable" and "relevant and appropriate" are defined as follows:

- Applicable requirements are those cleanup standards, standards of control, or other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those state standards that are identified by a state in a timely manner and that are more stringent than Federal requirements may be applicable. "Applicability" implies that the remedial action or the circumstances at the site satisfy all of the jurisdictional prerequisites of a requirement.

- Relevant and appropriate requirements are those cleanup standards, standard of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified in a timely manner and that are more stringent than Federal requirements may be relevant and appropriate.

Chemical-Specific ARARs. Chemical-specific ARARs are health- or risk-based concentration limits, numerical values, or methodologies for various environmental media (i.e., groundwater, surface water, air, and soil) that are established for a specific chemical that may be present in a specific media at the site, or that may be discharged to the site during remedial activities. These ARARs set limits on concentrations of specific hazardous substances, pollutants, and contaminants in the environment. Examples of this type of ARAR are ambient water quality criteria and drinking water standards.

Location-Specific ARARs. Location-specific requirements set restrictions on certain types of activities based on site characteristics. Federal and state location-specific ARARs are restrictions placed on the concentration of a contaminant or the activities to be conducted because they are in a specific location. Examples of special locations possibly requiring ARARs may include flood plains, wetlands, historic places, and sensitive ecosystems or habitats.

Action-Specific ARARs. Action-specific requirements are technology- or activity-based requirements which are triggered by the type of remedial activities under consideration. Examples are Resource, Conservation and Recovery Act (RCRA) regulations for waste treatment, storage or disposal.

Neither CERCLA nor the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (400 C.F.R. Part 300) provides across-the-board standards for determining whether a particular remedy will result in an adequate cleanup at a particular site. Rather, the process recognizes that each site will have unique characteristics that must be evaluated and compared to those requirements that apply under the given circumstances. Therefore, ARARs are identified on a site-specific basis from information about specific chemicals at the site, specific features of the site location, and actions that are being considered as remedies.

The following section outlines the Applicable or Relevant and Appropriate Requirements (ARARs) that apply to this site.

10.1 Chemical-Specific ARARs

10.1.1 Federal Drinking Water Standards

Section 1412 of the Safe Drinking Water Act (SDWA), 42 U.S.C. S300g-1, "National Water Regulations"; National Primary Drinking Water Regulations, 40 CFR Part 141.

EPA has established Maximum Contaminant Levels (MCLs) (40 CFR Part 141) under the Safe Drinking Water Act (SDWA) to protect public health from contaminants that may be found in drinking water sources. These requirements are applicable at the tap for water provided directly to 25 or more people or which will be supplied to 15 or more service connections. The MCLs are applicable to any water that would be served as drinking water. Under NCP Section 300.430(f)(5), remedial actions must generally attain MCLs and non-zero Maximum Contaminant Level Goals (MCLGs) for remedial actions where the groundwater is currently or potentially a source of drinking water.

The groundwater at the Newmark OU is a potential source of drinking water. However, since the Newmark OU remedial action is an interim action, chemical-specific cleanup requirements for the aquifer such as attaining MCLs and non-zero MCLGs, which would be ARARs for a final remedy, are not ARARs for this interim action. (See NCP, 55 Fed. Reg. 8755.) Nevertheless, EPA has determined that for the treatment plant effluent from the Newmark OU, the Federal Maximum Contaminant Levels (MCLs) for VOCs and any more stringent State of California MCLs for VOCs are relevant and appropriate and must be attained regardless of the end use or discharge method for the treated water.

For the treated water which will be put into the public water supply, all legal requirements for drinking water in existence at the time that the water is served will have to be met because EPA considers serving of the water to the public (at the tap) to be off-site. Since these are not ARARs, these requirements are not "frozen" as of the date of the ROD. Rather, they can change over time as new laws and regulations applicable to drinking water change. See NCP, 55 Fed. Reg. 8758 (March 8, 1990).

10.1.2 <u>State Drinking Water Standards</u>

<u>California Safe Drinking Water Act, Health and Safety Code, Division 5, Part 1, Chapter 7, §4010 et seq., California Domestic Water Quality Monitoring regulations, CCR Title 22, Division 4, Chapter 15, §64401 et seq.</u>

California has also established drinking water standards for sources of public drinking water, under the California Safe Drinking Water Act of 1976, Health and Safety Code Sections 4010.1(b) and 4026(c). California has promulgated MCLs for primary VOCs. Several of the State MCLs are more stringent than Federal MCLs. In these cases, EPA has determined that the more stringent State MCLs for VOCs are relevant and appropriate for the treatment plant effluent from the Newmark OU interim remedy. The VOCs for which there are more stringent State standards include: benzene; carbon tetrachloride; 1,2-dichloroethane (1,2-DCA); 1,1-dichloroethene (1,1-DCE); cis-1,2-DCE; trans-1,2-DCE; and xylene. There are also some chemicals where State MCLs exist but there are no Federal MCLs. EPA has determined that these State MCLs are relevant and appropriate for the treated water prior to discharge or delivery to the water purveyor. The VOCs for which there are no Federal MCLs but for which State MCLs exist include: 1,1-DCA; 1,1,2,2-tetrachloroethane; and 1,1,2-trichloroethane.

Water served as drinking water is required to meet MCLs at the tap, not MCLGs. Therefore, EPA would generally not expect a future change in an MCLG to affect the use of treated groundwater as a drinking water source. The cumulative hazard index is also not an ARAR. However, EPA does retain the authority to require changes in the remedy if necessary to protect human health and the environment, including changes to previously selected ARARS. See

40 C.F.R. Sections 300.430(f)(1)(ii)(B)(1) and 300.430(f)(5)(iii)(C). If EPA receives new information indicating the remedy is not protective of public health and the environment, EPA would review the remedy and make any changes necessary to ensure protectiveness.

EPA has also determined that the monitoring requirements found in CCR Title 22 Sections 64421-64445.2 are relevant and appropriate for any treated water which will be delivered to a public water distribution system. However, the selection of these sections as ARARs involves only the requirements that specific monitoring be performed. It would not include any administrative requirements (such as reporting requirements) and would also not include meeting substantive standards set within these sections since no such standards have been identified by the State as being more stringent than Federal requirements. For the off-site portion of this remedy, including serving of the treated water, all applicable requirements would have to be satisfied including the monitoring requirements in CCR Title 22 Sections 64421-64445.2.

Accordingly, the chemical-specific standards for the groundwater extracted and treated under the Newmark OU interim remedy are the current Federal or State MCLs for VOCs, whichever is more stringent.

10.2 Location-Specific ARARs

No special characteristics exist in the Newmark OU to warrant location-specific requirements. Therefore, EPA has determined that there are no location-specific ARARs for the Newmark OU.

10.3 Action-Specific ARARs

10.3.1 Clean Air Act, 42 U.S.C. §7401 et seq.

Rules and Regulations of the South Coast Air Quality Management District

The Newmark OU alternative treatment of VOCs by air stripping, whereby the volatiles are emitted to the atmosphere, triggers action- specific ARARs with respect to air quality.

The Clean Air Act regulates air emissions to protect human health and the environment, and is the enabling statute for air quality programs and standards. The substantive requirements of programs provided under the Clean Air Act are implemented primarily through Air Pollution Control Districts. The South Coast Air Quality Management District (SCAQMD) is the district regulating air quality in the San Bernardino area.

The SCAQMD has adopted rules that limit air emissions of identified toxics and contaminants. The SCAQMD Regulation XIV, comprising Rules 1401, on new source review of carcinogenic air contaminants is applicable for the Newmark OU. SCAQMD Rule 1401 also requires that best available control technology (T-BACT) be employed for new stationary operating equipment, so the cumulative carcinogenic impact from air toxics does not exceed the maximum individual cancer risk limit of ten in one million (1×10^{-5}). EPA has determined that this T-BACT rule is applicable for the Newmark OU because compounds such as PCE and TCE are present in groundwater, and release of these compounds to the atmosphere may pose health risks exceeding SCAQMD requirements.

The substantive portions of SCAQMD Regulation XIII, comprising Rules 1301 through 1313, on new source review are also ARARs for the Newmark OU.

The SCAQMD also has rules to limit the visible emissions from a point source (Rule 401), which prohibits discharge of material that is odorous or causes injury, nuisance or annoyance to the public (Rule 402), and limits down-wind particulate concentrations (Rule 403). EPA has determined that these rules are also ARARs for the Newmark OU interim remedy.

10.3.2 Water Quality Standards for Reinjection and Discharges of Treated Water to Surface Waters or Land

Federal Standards

The Safe Drinking Water Act provides Federal authority over injection wells. The Federal Underground Injection Control Plan is codified in Part 144 of 40 C.F.R and prohibits injection wells such as those that would be located at the Site from (1) causing a violation of primary MCLs in the receiving waters and (2) adversely affecting the health of persons. 40 C.F.R. §144.12. Section 144.13 of the Federal Underground Injection Control Plan provides that contaminated ground water that has been treated may be reinjected into the formation from which it is withdrawn if such injection is conducted pursuant to a CERCLA cleanup and is approved by EPA. 40 C.F.R. §144.13. These regulations are applicable to any Newmark OU treated water that is reinjected into the aquifer.

The Resource Conservation and Recovery Act (RCRA) Section 3020 is also an action-specific ARAR. This section of RCRA provides that the ban on the disposal of hazardous waste into a formation which contains an underground source of drinking water (set forth in Section 3020(a)) shall not apply to the injection of contaminated groundwater into the aquifer if: (i) such injection is part of a response action under CERCLA; (ii) such contaminated groundwater is treated to substantially reduce hazardous constituents prior to such injection; and (iii) such response action will, upon completion, be sufficient to protect human health and the environment. RCRA Section 3020(b).

State Standards

Reinjection to Groundwater

For any reinjection to the basin, including spreading, or discharges to surface water or land that occur on-site, the reinjected or discharged water must meet all action-specific ARARs for such reinjection or discharge. The ARAR applicable to the reinjected water (Alternative 5) is:

- The Santa Ana Regional Water Quality Control Board's Water Quality Control Plan for the Santa Ana River (and specific Bunker Hill Sub-basins), which incorporates State Water Resources Control Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California." Resolution No. 68-16 requires maintenance of existing State water quality unless it is demonstrated that a change will benefit the people of California, will not unreasonably affect present or potential uses, and will not result in water quality less than that prescribed by other State policies.

Temporary Discharges to Surface Water

EPA anticipates that there may be short-term discharges of treated water to the flood control channel or storm drains during the initial operation of the VOC treatment plant and on certain other limited occasions. The ARAR for any treated water that is discharged, on a short term basis, to surface waters is the National Pollutant Discharge Elimination System (NPDES) Program which is implemented by the SARWQCB. In establishing effluent limitations for such discharges, the SARWQCB considers the Water Quality Control Plan for the Santa Ana River Basin, Bunker Hill Sub-basins (the "Basin Plan"), which incorporates Resolution 68-16, the Inland Surface Water Plan and Temperature Plan for Surface Waters, and the best available technology economically achievable (BAT). See, Cal. Water Code § 13263.

Since the RWQCB did not identify specific substantive discharge requirements or technology standards for such temporary discharges, EPA has reviewed the Basin Plan (with related documents) and considered BAT and has made certain determinations for the short-term discharges to surface waters. In order to comply with this ARAR, any groundwater that will be discharged, on a short-term basis, to surface waters on-site must be treated to meet Federal MCLs or State MCLs for VOCs, whichever is more stringent.

10.3.3 Secondary Drinking Water Quality Standards

The State of California's Secondary Drinking Water Standards (SDWS) which are more stringent than the Federal Secondary Drinking Water Standards shall be ARARs for the Newmark OU if the final use option involves serving treated groundwater as drinking water. 22 CCR §64471. The California SDWS are selected as ARARs because they are promulgated State standards and are relevant and appropriate to the action of supplying the treated water to a public water supplier. Although California SDWS are not applicable to non-public water system suppliers, the California SDWS are relevant and appropriate since the treated water under this action would be put into the public drinking water system. Since the Federal SWDS are not enforceable limits and are intended as guidelines only, they are not ARARs for this action. Furthermore, since the State SDWS are more stringent than the Federal SDWS, EPA has not selected the Federal SDWS as requirements for this action. In summary, if the treated water is to be served as drinking water, the treated water at the point of delivery must meet the California SDWS. If the treated water is recharged or (temporarily) discharged to the flood control channel, the water will not be required to meet State SDWS.

The Safe Drinking Water Act provides Federal authority over injection wells. The Federal Underground Injection Control Plan is codified in Part 144 of 40 C.F.R and prohibits injection wells such as those that would be located at the Site from (1) causing a violation of primary MCLs in the receiving waters and (2) adversely affecting the health of persons. 40 C.F.R. §144.12. Section 144.13 of the Federal Underground Injection Control Plan provides that contaminated ground water that has been treated may be reinjected into the formation from which it is withdrawn if such injection is conducted pursuant to a CERCLA cleanup and is approved by EPA. 40 C.F.R. §144.13. These regulations are applicable to any Newmark OU treated water that is reinjected into the groundwater on the Newmark site.

10.3.4 <u>Resource Conservation and Recovery Act (RCRA) and Hazardous Solid Waste Amendment (HSWA) Standards, 42 U.S.C. §§6901-6987.</u>

RCRA, passed by Congress in 1976 and amended by the Hazardous and Solid Waste Amendments of 1984, contains several provisions that are ARARs for the Newmark OU. The State of California has been authorized to enforce its own hazardous waste regulations (California Hazardous Waste Control Act) in lieu of the Federal RCRA Program administered by the EPA. Therefore, State regulations in the California Code of Regulations (CCR), Title 22, Division 4.5, Environmental Health Standards for the management of Hazardous Wastes (hereinafter the State HWCA Regulations), are now cited as ARARs instead of the Federal RCRA Regulations.

Since the source of the contaminants in the groundwater is unclear, the contaminated groundwater is not a listed RCRA waste. However, the contaminants are sufficiently similar to RCRA wastes that EPA has determined that portions of the State's HWCA Regulations are relevant and appropriate. Specifically, the substantive requirements of the following general hazardous waste facility standards are relevant and appropriate to the VOC treatment plant for Alternatives 2 through 5: Section 66264.14 (security requirements), Section 66264.15 (location standards) and Section 66264.25 (precipitation standards).

In addition, an air stripper or GAC contactor would qualify as a RCRA miscellaneous unit if the contaminated water constitutes

RCRA hazardous waste. EPA has determined that the substantive requirements for miscellaneous units set forth in Sections 66264.601 -.603 and related substantive closure requirements set forth in 66264.111-.115 are relevant and appropriate for the air stripper or GAC contactor. The miscellaneous unit and related closure requirements are relevant and appropriate because the water is similar to RCRA hazardous waste, the air stripper or GAC contactor appear to qualify as a miscellaneous unit, and the air stripper or GAC contactor should be designed, operated, maintained and closed in a manner that will ensure the protection of human health or the environment.

The land disposal restrictions (LDR), 22 CCR Section 66268 are relevant and appropriate to discharges of contaminated or treated groundwater to land. The remedial alternatives presented do not include land disposal of untreated groundwater. Because of the uncertainty in the levels of contamination and volumes of water to be derived from monitoring and extraction wells at this site, these waters must be treated to meet Federal and State MCLs for VOCs, whichever is more stringent, prior to discharge to land. By meeting the Federal and State MCLs for VOCs before reinjection, Alternative 5 will satisfy the RCRA LDRs.

The container storage requirements in 22 CCR Sections 66264.170 -.178 are relevant and appropriate for the storage of contaminated groundwater over 90 days.

On-site storage or disposal of the spent carbon from the treatment system could trigger the State HWCA requirements for storage and disposal if the spent carbon contains sufficient quantities of hazardous constituents that cause the spent carbon to be classified as a characteristic hazardous waste. If the spent carbon is determined to be a hazardous waste under HWCA (Sections 66261 and 66262), the requirements for handling such waste set forth in Sections 66262 and 66268 are applicable.

Certain other portions of the State's HWCA's regulations are considered to be relevant but not appropriate to the VOC treatment plant. EPA has determined that the substantive requirements of Section 66264.15 (general inspection requirements), Section 66264.15 (personnel training) and Sections 66264.30-66264.56 (Preparedness and Prevention and Contingency Plan and Emergency Procedures) are relevant but not appropriate requirements for this treatment system. EPA has made this determination because the treatment plant will be required to have health and safety plans and operation and maintenance plans under CERCLA that are substantively equivalent to the requirements of Sections 66264.15, 66264.30-66264.56.

10.3.5 <u>California Water Well Standards.</u>

Substantive standards for construction of public water supply wells have been published by the State as the California Water Well Standards. While these standards have not been specifically promulgated as an enforceable regulation and are therefore not ARARs, all groundwater facilities designed, located and constructed to produce drinking water must be constructed in accordance with these standards. Since the remedy involves delivery of the treated water to the public supply system, EPA has determined that the action will comply with substantive Water Well Standards for construction of water supply wells, such as sealing the upper annular space to prevent surface contaminants from entering the water supply. Standards for location of the extraction wells are not appropriate, since the effectiveness of the remedy is dependent upon the well locations. Additionally, wells constructed solely for treatment and reinjection with no delivery to the public supply system would not be subject to these water well construction standards.

10.4 Summary of ARARs for the Newmark OU Interim Remedy

EPA has determined a number of chemical-, and action-specific ARARs for the Newmark OU interim remedy. All of the alternatives that involve groundwater extraction and treatment could achieve the chemical-specific treatment standards for the groundwater at the point of delivery. However, Alternative 4 which uses an advanced oxidation process is a less certain technology than liquid-phase GAC adsorption or air stripping for such a large volume of water and therefore is somewhat less likely to achieve the chemical-specific ARARs.

Requirements of nonenvironmental laws, such as California OSHA regulations (8 CCR 5192) are not considered as ARARs and all such requirements applicable at the time of the activity would have to be satisfied.

11.0 THE SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the detailed analysis of the alternatives, and public comments, EPA has determined that Alternative 2: Extraction, Treatment of VOCs by liquid phase GAC (or air stripping with Best Available Control Technology for emissions), and Conveyance to a public water distribution system, in combination with Alternative 5 (as a contingency): Extraction, Treatment of VOCs, and Recharge to the aquifer, is the most appropriate interim remedy for the Newmark OU.

Alternative 2 involves groundwater extraction (pumping) of 8,000 gallons per minute (gpm) in the vicinity of 14th Street, between Arrowhead and Waterman Avenues, at the leading edge of the contaminant plume, and an additional 4,000 gpm at the Newmark wellfield (near 48th Street and Little Mountain Drive) where the contamination enters the eastern part of the valley. Various locations and scenarios for extraction wells and rates of extraction are proposed in the FS report for the Newmark OU; however, all design decisions for this interim remedy will be made during the remedial design phase. During the remedial design phase the locations proposed for extraction wells and scenarios for rates of extraction per individual well may be selected or new ones may be selected. The exact number, location and other design specifics of new extraction wells will be determined during the remedial design phase of the project to inhibit the migration of the contaminant plume most effectively. Wherever appropriate, existing water production wells will be utilized for the remedy, and new wells will be constructed as necessary, as discussed in the Newmark OU FS Report.

All the extracted contaminated groundwater shall be treated to remove VOCs by either of two proven treatment technologies: **granular activated carbon (GAC) filtration** or **air stripping**. EPA determined during the Feasibility Study (March 1993) that these treatment technologies are equally effective at removing VOCs and are similar in cost at this OU. Both technologies have been proven to be reliable in similar applications. It is acceptable to use one technology for the northern (Newmark wellfield) facility and the other at the southern treatment facility. Existing treatment facilities (e.g., the air stripping towers at the Newmark wellfield) may be modified and incorporated into the remedy as appropriate. As a result of comments received during the public comment period, EPA may use a modification of liquid phase GAC (Advanced Oxidation pretreatment) if this modification proves to be effective and economical during design phase testing and analysis. The VOC treatment technology which best meets the objectives of the remedy for the Newmark OU will be determined during the remedial design phase, when more detailed information is available to assess effectiveness and cost.

The treated water exiting the treatment plant shall meet all MCLs and secondary drinking water standards. If air stripping treatment is selected, air emissions shall be treated using the best available control technology (e.g., vapor phase GAC or an acceptable innovative technology) to ensure that all air emissions meet ARARs.

The treated water will be piped to the public water supply system for distribution. Groundwater monitoring wells will be installed and sampled regularly to help evaluate the effectiveness of the remedy. More specifically, groundwater monitoring will be conducted no less frequently than quarterly to obtain information needed to: 1) evaluate influent and effluent water quality, 2) determine and evaluate the capture zone of the extraction wells, 3) evaluate the vertical and lateral (including downgradient) migration of contaminants, 4) (if the contingency alternative is implemented) to evaluate the effectiveness of the recharge well system and its impact on the remedy and 5) to monitor any other factors associated with the effectiveness of the interim remedy determined to be necessary during remedial design. Monitoring frequency may be decreased to less than quarterly if EPA determines that conditions warrant such a decrease.

EPA has selected Alternative 5 as a contingency if the public water supply system does not accept any or all of the treated water (possibly due to water supply needs). Any remaining portion of water will be recharged into the aquifer via reinjection wells near the edge of the plume. The number, location and design of the reinjection wells will be determined during the remedial design phase to best meet the objectives of the remedy and meet applicable or relevant and appropriate requirements. With the exception of the need to meet secondary MCLs and final use of the treated water, Alternative 5 is identical to Alternative 2 above.

The total duration of the Newmark OU interim remedy will be 33 years, with the first three years for design and construction. EPA will review this action every five years throughout this interim remedy period and again at the conclusion of this period.

The VOC treatment plant of the Newmark OU interim remedy (whether it be Alternative 2, Alternative 5 or a combination thereof) shall be designed and operated so as to prevent the unknowing entry, and minimize the possible effect of unauthorized entry, of persons or livestock into the active portion of the facility. A perimeter fence shall be erected around the VOC treatment plant if an adequate fence or other existing security system is not already in place at the plant site. This fence should be in place prior to initiation of the remedial action and should remain in place throughout the duration of the remedy. The VOC treatment plant shall also be designed and operated so as to prevent releases of contaminated groundwater from the plant.

The selected remedy for the Newmark OU meets all of EPA's nine evaluation criteria. The selected remedy is equally effective as the other alternatives in the short-term and long term reduction of risk to human health and the environment by removing contaminants from the aquifer, by inhibiting further downgradient migration of the contaminant plume, and by reducing the toxicity, mobility and volume of contaminants in the aquifer.

The VOC treatment technologies selected (liquid phase GAC or air stripping with best available control technology for emissions) are technically feasible and proven effective at meeting ARARs for VOCs in the treated groundwater.

Alternative 2, in combination with Alternative 5, could be implemented, both technically and administratively.

In a letter dated July 29, 1993, the State concurred with EPA's selected remedy. EPA received several public comments during the public comment period, the majority of which expressed support for EPA's preferred alternative. These comments, along with EPA's responses are presented in Part III of this ROD, the Responsiveness Summary.

The selected remedy is protective of human health and the environment, meets ARARs, and provides beneficial uses (distribution to a public water supply and/or recharge) for the treated water. The selected remedy is cost-effective. The estimated cost of Alternative 2 has a total present worth of $49,900,000, which is in the middle of the range for all five alternatives. The estimated total cost of Alternative 5 is $48,100,000.

12.0 STATUTORY DETERMINATIONS

As required under Section 121 of CERCLA, the selected interim remedial action is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the interim remedial action, and is cost effective. The selected remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment to reduce toxicity, mobility, and volume as a principal element.

The selected interim remedial action is protective of human health and the environment in that it removes significant VOC contaminant mass from the upper zones of the aquifer and inhibiting further downgradient and vertical migration of contaminated groundwater.

The VOC treatment technologies selected (liquid phase GAC or air stripping with best available control technology for emissions) are technically feasible and proven effective at meeting ARARs for VOCs in the treated groundwater and the air.

The selected remedy permanently and significantly reduces the toxicity, mobility and volume of hazardous substances in the aquifer as well as the extracted groundwater.

Because this remedy will result in hazardous substances remaining on-site above health-based levels, EPA shall conduct a review, pursuant to CERCLA Section 121, 42 U.S.C. Section 9621, at least once every five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

13.0 DOCUMENTATION OF SIGNIFICANT CHANGES

The only significant change to the Newmark OU interim remedy proposed in the Proposed Plan fact sheet dated March, 1993, involves the possible use of a modification to the liquid phase GAC treatment technology.

As a result of comments received during the public comment period, EPA further evaluated the use of an advanced oxidation system as pretreatment for liquid-phase GAC. Additional research on system effectiveness and revised cost estimates based vendor reports can be found in the following technical memorandum: Analysis of "Hybrid" Advanced Oxidation Pretreatment / Activated Carbon Alternative for the Newmark Operable Unit (June 25, 1993) included in the Administrative Record for the Newmark OU. Pretreatment with a destructive technology has the theoretical advantage of reducing contaminant mass while enhancing the operation of a reliable conventional technology. EPA may use this modification of liquid phase GAC if this modification proves to be effective and economical during design phase testing and analysis.

The impact of this potential change is that the reliability of the conventional liquid phase GAC technology is retained and some desirable destruction of contaminants is realized. Since this option would only be a modification of the conventional technology, the advanced oxidation system would not need to be designed to achieve full treatment of the VOCs, reducing the cost of the innovative component of the treatment. The cost of operation of the liquid phase GAC would also be reduced, offsetting a portion of the increased capital costs.