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Record of Decision:

NEWMARK GROUND WATER CONTAMINATION
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MUSCOY PLUME OPERABLE UNIT
RECORD OF DECISION

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NEWMARK GROUNDWATER CONTAMINATION SUPERFUND SITE

SAN BERNARDINO, CALIFORNIA

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

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PART I. DECLARATION

SITE NAME AND LOCATION

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

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Muscoy Plume Operable Unit, Newmark Groundwater Contamination Superfund site, chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), 42 U.S.C. §§9601 et seq., and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (National Contingency Plan or NCP), 40 CFR Part 300. This decision is based on the administrative record for this operable unit.

In a letter to EPA dated March 21, 1995 the State of California, through the California Environmental Protection Agency's (Cal-EPA) Department of Toxic Substances Control (DTSC) concurred with the selected remedy for the Muscoy Plume Operable Unit.

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 Record of Decision (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 Muscoy plume of groundwater contamination in the Newmark Groundwater Contamination Superfund Site. This portion of the site cleanup is referred to as the Muscoy Plume Operable Unit (ou). An OU is a discrete action that comprises an incremental step toward comprehensively addressing Superfund site problems. The Muscoy Plume OU is an interim action focusing on contamination in the underground water supply in the Bunker Hill Basin of San Bernardino, west of the Shandin Hills (Figures 1 and 2). The portion of the groundwater contamination north and east of the Shandin Hills, called the Newmark OU, was addressed in a separate action (Newmark OU Record of Decision, August 4, 1993). The selected remedy and all of the alternatives presented in the feasibility study were developed to meet the following specific objectives for the Muscoy Plume OU:

- To inhibit migration of groundwater contamination into clean portions of the aquifer;
- To protect downgradient municipal supply wells south and southwest of the Shandin Hills;
- 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 6,200 gallons per minute (gpm) in San Bernardino at the leading edge of the contaminant plume (Fig. 2), which is approximately between Highland Avenue and Base Line Street, west of Interstate 215 and east of Medical Center Drive. The exact number, location and other design specifics of the 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 Volatile Organic Compounds

(VOCs) by either of two proven treatment technologies: granular activated carbon (GAC) filtration or air stripping. EPA determined during the Feasibility Study (December 1994) 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. The VOC treatment technology which best meets the objectives of the remedy for the Muscoy Plume 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 all applicable or relevant and appropriate drinking water standards for VOCs (See Table 2). 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 transferred to a public water supply agency for distribution. Groundwater monitoring wells will be installed and sampled regularly to help evaluate the effectiveness of the remedy.

If the public water supply agency 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 Muscoy Plume OU interim remedy will be approximately 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 to ensure that the remedy continues to be protective of human health and the environment.

The remedial action for the Muscoy Plume 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 o clean portions of the aquifer, protecting downgradient municipal supply wells south and southwest of the Shandin Hills and beginning to remove contaminant mass from the aquifer in the Muscoy plume) are not inconsistent with and will not preclude implementation of any final, overall remedial action or actions selected by EPA in the future for the Newmark Groundwater Contamination Superfund Site.

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 this site.

Because this interim 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 interim remedy continues to provide adequate protection of human health and the environment.

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Keith A. Takata Date
Deputy Director for Superfund
Hazardous Waste Management Division

PART II. DECISION SUMMARY

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

1. SITE LOCATION AND DESCRIPTION

The Muscoy Plume 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 Groundwater Contamination Superfund Site (hereinafter referred to as the Newmark Superfund Site).

1.1 Description of the Bunker Hill Basin

The groundwater contamination at the Newmark Superfund Site 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) Waters 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.

The groundwater in this aquifer is a valuable resource, currently serving nearly a half-million residents of San Bernardino, Riverside and surrounding communities. According to the San Bernardino Valley Municipal Water District, the Bunker Hill Basin aquifer is capable of storing approximately 1.6 trillion gallons and producing 81 billion gallons each year.

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 bedrock formations that act as barriers to further vertical movement. The Shandin Hills, created by an upward fold in these impermeable bedrock formations, forces groundwater flowing from the north and west to flow around either side of the hills 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 a large supply of water for nearby communities. The aquifer receives rainfall and natural runoff from the surrounding mountains, collected floodwater from rivers, creeks and washes, and water imported from outside the region that is spread over percolation basins.

The Muscoy plume encompasses a portion of the Bunker Hill aquifer located beneath the western portion of the city of San Bernardino and an unincorporated part of San Bernardino County known as the Muscoy community. Residential and commercial use predominates throughout the Newmark Superfund Site. Very little of the area remains undeveloped.

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1.2 Description and Background of the Newmark Superfund Site

The primary contaminants of concern at the Newmark Superfund Site are the solvents perchloroethylene (PCE) and trichloroethylene (TCE), which are widely used in a variety of industries, including dry cleaning, metal plating, and machinery degreasing. These organic solvents are in a class of chemicals, known as volatile organic compounds (VOCs), which evaporate (volatilize) readily at room temperature. If large enough amounts of PCE and TCE are spilled or leaked onto the ground, these chemicals can reach the aquifer where they will slowly dissolve into groundwater. As the contaminated water flows away from the source, a plume of contaminated water can spread many miles downstream. Wells within the plume will be pumping contaminated water.

As of 1995, PCE and TCE in concentrations exceeding the drinking water standards of 5 micrograms per liter (parts per billion) have been detected in 20 public water supply wells in northern San Bernardino. The pattern of contamination, defined by sampling monitoring wells and water supply wells throughout the Newmark Superfund Site (see Figure 3), indicates that a release or releases occurred in northwest San Bernardino (approximately in the area of a former military depot known as the San Bernardino Engineering Depot or Camp Ono), and that contaminants have spread more than five miles toward the Santa Ana river to the southeast. A major outcrop of relatively impermeable bedrock (the Shandin Hills) splits the plume of contaminated groundwater into an eastern branch (the Newmark plume) and a western branch (the Muscoy plume). EPA is addressing the leading edges of the plume as two separate Operable Units. The identification, characterization and remediation of the source of contamination will constitute a third Operable Unit. The RI/FS report for the Newmark OU was finalized in March, 1993, and EPA's Regional Administrator signed a Record of Decision for the Newmark OU interim remedy on August 4, 1993. The Newmark OU Remedial Design was initiated in September, 1993, and is expected to be completed in early 1995.

1.3 Description and Background of the Muscoy Plume Operable Unit

The Muscoy Plume OU encompasses a portion of the Bunker Hill Basin aquifer beneath the northern portion of the city of San Bernardino and an unincorporated portion of San Bernardino County known as the Muscoy community. The Muscoy plume is the western lobe of the Newmark Superfund Site groundwater contamination. This contamination has migrated south of Highland Avenue in San Bernardino along a flow path roughly parallel to the Cajon Wash. The Cajon Wash, a major recharge zone of the Bunker Hill groundwater basin, prevents the contaminants from migrating further west and tends to push the contaminants toward the east. The Shandin Hills bedrock outcrop limits the eastern flow of the Muscoy plume. The leading edge of the Muscoy plume arrived at San Bernardino's 19th Street wells in the mid to late 1980's but has not yet reached the wells at 10th Street, approximately one mile to the southeast. At an estimated flow rate of 300 to 500 feet per year, contaminated groundwater would require ten to twenty years to migrate from the 19th Street wells to the 10th Street wellfields.

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) plume of groundwater contamination.

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The EPA Remedial Investigation (RI) began in late 1990, focusing entirely on the Newmark plume. Results from the RI showed that the originally suspected source of the Newmark plume (a disposal pit for waste liquids from a former airport) was not the source of the contamination. Additional well drilling in the summer of 1992 traced the groundwater contamination back through a previously undiscovered underground channel flowing from the western (Muscoy) side of the valley. EPA expanded the Newmark Superfund Site Remedial Investigation in September, 1992 to include the Muscoy plume.

Due to EPA's experience with the Newmark plume and to the availability of over ten years of water quality data from state and local groundwater investigations in San Bernardino, EPA was able to expedite the Remedial Investigation of the Muscoy Plume OU. In 1992 all available wells in the vicinity of the Muscoy plume were sampled by EPA. PCE and TCE were the most prevalent contaminants in all of the contaminated wells. Other VOCs were also detected in trace quantities. These results were consistent with water quality samples analyzed by state and local authorities since 1980.

In 1993, EPA recognized that sufficient information had been collected to develop interim action alternatives to control the spread of the Muscoy plume while proceeding with field work to identify the source. The Muscoy Plume OU has the limited objectives of addressing migration at the leading edge of the plume while EPA continues to investigate the source of the contamination. The RI/FS Report for the Muscoy Plume OU was finalized in December, 1994.

2. SITE HISTORY

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 1995, a total of thirteen public water supply wells have been contaminated by the solvents in the Newmark plume, and seven water supply wells have been affected in the Muscoy plume.

The cities of San Bernardino, Riverside and other water agencies in the area closely monitor the quality of drinking water delivered to residents. These entities have taken the necessary steps to ensure that the water served to residents meets all federal and state drinking water requirements.

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 four water treatment systems 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.

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. However, 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 of the Newmark Superfund Site 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. Waste oil and solvents were disposed of at this site 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 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 µg/l (parts per billion) of PCE.

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 is the likely origin of both the Newmark and Muscoy plumes.

While ongoing investigations attempt to definitively identify the source, EPA determined that the continuing migration of the Muscoy plume could be inhibited through an interim remedial action (the Muscoy Plume OU).

3. ENFORCEMENT ACTIVITIES

The results of the Remedial Investigation and other investigations undertaken by EPA and state agencies indicate that the project lead for the Muscoy Plume OU will remain with EPA.

As explained above, the disposal pits at the former San Bernardino Airport site were originally suspected to be the source of the contamination. Considerable effort was expended on a search for Potentially Responsible Parties (PRPs) while the airport site disposal pits were the suspected source. However, results of the Remedial Investigation reveal that the source of the

contamination is more than one mile upgradient of the originally 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 current focus of the PRP search is on the potential sources located to the northwest of the Shandin Hills. These potential sources include the San Bernardino Engineering Depot (a WWII-era army base decommissioned in 1947, commonly known as Camp Ono), a closed county landfill (the Cajon landfill), and subsequent industrial activities at the site of the former Camp Ono.

EPA formally requested detailed information from the Department of Defense (DoD) concerning the operations at the former Camp Ono in 1993 and again in 1994. A partial reply to the earlier request was received November, 1993. In this response, the DoD noted that solvents had been used and disposed of at the base. The designated DoD representative reported that research into EPA's 1994 information request has commenced. The Department of Defense was notified of its potential liability in a General Notice letter sent on December 22, 1993. EPA and DoD (through the Army Corps of Engineers) have been communicating regularly regarding the Newmark Superfund Site throughout 1994. On December 16, 1994, the designated representative of the Department of Defense was sent a copy of the Muscoy Plume Proposed Plan, with a transmittal letter stating that the Muscoy Plume OU was the second OU of the Newmark Superfund Site. EPA noted that the previous General Notice letter sent on December 22, 1993, notified DoD of potential liability for the entire Newmark Superfund Site.

4. HIGHLIGHTS OF COMMUNITY PARTICIPATION

EPA's preferred remedial alternative, as well as four other alternatives were described in EPA's Proposed Plan for the Muscoy Plume OU (Deeeraber 1994). The Proposed Plan was in the form of a fact sheet and was distributed to all parties (approximately 700) on EPA's mailing list for the Newmark project. The public comment period was extended to more than 5 weeks (38 days) to compensate for the holiday period in December. EPA received no requests for extensions from members of the public. The public comment period closed on January 20, 1995. EPA received approximately 16 comments, with a large proportion relating to source characterization rather than control of the Muscoy plume. 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 December 16, 1994. The press release and the Proposed Plan Fact Sheet announced that a public meeting to discuss and receive comments on the Muscoy Plume Proposed Plan was scheduled for January 10, 1995. Notice of the public meeting as well as the availability of the Proposed Plan was published in the Inland Empire Sun on December 14, 1994. In addition, several newspaper articles were written about the Remedial Investigation, the Feasibility Study and the Proposed Plan for the Muscoy Plume OU. A map of the Muscoy Plume OU was provided in the Proposed Plan and the above-referenced newspaper articles published maps and described the area that would be impacted by the Muscoy Plume OU.

A public meeting was held in the City of San Bernardino Council Chambers on January 10, 1995, 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.

Three different home-owners' associations, the Muscoy Municipal Advisory Council and several water supply agencies accepted EPA's offer for informal discussions of the project. Drilling around these communities was greatly facilitated by open communication, including distribution of four fact sheets. 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 project.

5. SCOPE AND ROLE OF THE OPERABLE UNIT

The interim remedial action for the Muscoy Plume OU represents a discrete element in the overall long-term remediation of groundwater contamination in the San Bernardino area. Since the source of the contamination has not been definitively identified, the final overall plan for the remediation of the entire Newmark Groundwater Contamination Site has not yet been determined. The Muscoy plume constitutes a major portion of the contaminated aquifer and the Muscoy Plume OU interim remedial action will be a significant step toward eventual remediation. EPA does not expect the objectives of this interim action to be inconsistent with, or preclude, any final action for the entire site.

The objectives of the Muscoy Plume OU are:

- To inhibit migration of groundwater contamination into clean portions of the aquifer;
- To protect downgradient municipal supply wells south and southwest of the Shandin Hills;
- 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 important sources of drinking water.

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 entire Newmark Superfund Site. It is expected that the Muscoy Plume OU remedy will constitute an integral part of the final 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 Superfund Site.

Table 1. Maximum Concentrations of Volatile Organic Compounds Detected (above 0.5 µg/l detection limit) in Wells in the Muscoy Plume

Compound	Maximum Concentration (µg/l)
1,1 Dichloroethane (DCA)	0.8
cis- 1,2-Dichloroethene (DCE)	6
Trichloroethene (TCE)	6
Tetrachloroethene (PCE)	27
Dichlorodifluoromethane (Freon 12)	28
Trichlorofluoromethane (Freon 11)	4

6. SUMMARY OF MUSCOY PLUME OU SITE CHARACTERISTICS

EPA's Remedial Investigation provided critical understanding in three general areas: groundwater flow characteristics, contaminant identification and concentration, and potential routes of

exposure.

The Remedial Investigation confirmed that most recharge to the Muscoy Plume OU part of the Bunker Hill Basin originates along the San Bernardino and San Gabriel Mountains to the north via the Cajon Wash along the west. Drinking water wells north and west of the site show that this source is not contaminated. Another important observation was that clay or silt layers that would inhibit vertical contaminant migration were not present in wells near the leading edge of the plume. This indicates that contaminants at any depth in the aquifer would not be prevented from entering water supply wells in the area, regardless of the depth of the water supply well. A groundwater flow model was successfully developed to describe the aquifer behavior and proved to be a useful tool in developing remedial alternatives.

The contaminants identified were predominantly chlorinated solvents. (Table 1) Tetrachloroethene (PCE) was found in all contaminated wells at concentrations less than 30 parts per billion (ppb). Trichloroethene (TCE) was the next most common contaminant, and never exceeded 10 ppb. Other related contaminants of concern, cis-1,2-dichloroethene (DCE) and 1,1-dichloroethane (DCA), were identified at concentrations below drinking water standards. Chlorofluorocarbons (freons) were also detected.

Analysis of potential exposure routes during the Remedial Investigation concluded that the only measurable exposure to the VOCs would be through untreated domestic water supply. Several state and EPA investigations failed to identify VOC contamination at the surface or within ten feet of the soil surface anywhere at the Newmark Superfund Site. Consequently, direct contact with VOC's via surface soil is not a possible exposure route. Further EPA investigations examined the potential for volatile chemicals to enter residences through the soil. Direct in-home measurements confirmed EPA calculations that this also is not a possible exposure route. Exposure through untreated domestic water supply is discussed thoroughly in the Site Risk section below.

7. 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 Muscoy Plume 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 Muscoy Plume 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

The potential for non-carcinogenic health effects was estimated by calculating a hazard index for the sum of all the compounds of potential concern in the Muscoy plume. The health index compares the levels of contaminants in the groundwater with levels that could cause an adverse non-cancer health effect. If the total hazard index reaches 1.0 or above, there may be a concern for potential health risks. The hazard index for the Muscoy Plume OU was less than 0.5, which indicated that non-carcinogenic health effects are negligible.

The risk assessment also estimated 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 did not pose a significant risk. Results of the RI indicated that direct exposure to volatile organic compounds (VOCs) from surface soil or from water 100 feet below ground was insignificant at this site (see Section 6.0 - Summary of Site Characteristics).

Chemicals of potential concern in the Muscoy Plume OU used in the risk assessment calculations included: PCE, TCE, cis-1,2-Dichloroethene (DCE), and other VOCs detected in at least one well. EPA will continue to monitor the groundwater in the Muscoy Plume 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 Muscoy Plume 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 50 in a million. EPA is taking an action at the Muscoy Plume 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 Muscoy Plume OU is presented in the Remedial Investigation and Feasibility Study Report for the Muscoy Plume OU (December 1994).

Environmental Risk Assessment

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. 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 Muscoy Plume OU. All of the alternatives were screened for: 1) effectiveness at protecting human 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 Muscoy Plume OU described previously.

Based on the results of the RI, EPA identified five cleanup alternatives for addressing groundwater contamination of the Muscoy Plume OU. Detailed descriptions of these alternatives are provided in the Muscoy Plume OU RI/FS Report (December, 1994). Rather than including all potential combinations of extraction locations and amounts, the initial screening process identified the most efficient extraction scenario that would meet our 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 an estimated 6,200 gallons per minute (gpm) of groundwater near the leading edge of the plume for a period of 30 years. The actual design capacity of the extraction and treatment facilities will be determined during the Remedial Design phase based on the latest refined groundwater information and modeling. The RI/FS Report analysis indicated that the final extraction rate is expected to be within the range of 5,000 gpm to 7,000 gpm. 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 issuance of the ROD, the remedy would proceed to 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 $2.2 million (present net worth).

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

Extraction

Alternative 2 involves the extraction of an estimated 5,200 gpm of contaminated groundwater placed at the leading edge of the Muscoy plume. The actual design capacity of the extraction and treatment facilities will be determined during the Remedial Design phase based on the latest refined groundwater information and modeling. 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 a Granular Activated Carbon (GAC) treatment plant EPA assumed that an entirely new treatment plant would be constructed near the extraction system and near a major distribution system pipeline. It may be possible to use an existing treatment plant site with construction of pipeline to the plant and from the plant to the distribution pipeline. 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.

Transfer of Treated Water

The treated water would meet all applicable or relevant and appropriate drinking water standards for VOCs and would be piped to a public water supply agency 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 are 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 formal assessment of the project effectiveness every five years.

The present net worth cost of Alternative 2, including capital costs and thirty years of operation and maintenance, is estimated at $26,000,000.

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

Alternative 3 involves the same extraction system, transfer of treated water to a public water agency and monitoring design as Alternative 2. Alternative 3 differs from Alternative 2 in the treatment of the extracted groundwater to remove VOCs to meet applicable or relevant and appropriate drinking water standards for VOCs. 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 ranular 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.

The present net worth cost of Alternative 3, including capital costs and thirty years of operation and maintenance, is estimated at $21,500,000.

ALTERNATIVE 4: Extract/Treat (Advanced Oxidation - Peroxide/Ozone)/Public Water Agency

Alternative 4 involves the same extraction, transfer of treated water to a public water agency 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 treated water would meet all applicable or relevant and appropriate drinking water standards for VOCs and would be piped to a public water supply agency. Groundwater monitoring wells would be installed to evaluate the effectiveness of the action.

The present net worth cost of Alternative 4, including capital costs and thirty years of operation and maintenance, is estimated at $32,000,000.

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 state reinjection standards before being returned to the aquifer.

The present net worth cost of Alternative 5, including capital costs and thirty years of operation and maintenance, is estimated at $30,800,000.

9. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

A comparative analysis of the alternatives against the nine evaluation criteria set forth in the NCP at 40 CFR 300.430 (e)(9)(iii) 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 carcinogenic risk if a person were exposed to the untreated groundwater through the domestic water supply, although the risk is 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 via liquid phase GAC adsorption would reduce substantially the toxicity and mobility of contaminants in the aqueous phase. The absorption 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 day-to-day 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. The reliability concerns for large-scale applications, coupled with the uncertainties associated with design, capital and operational costs and with the fact that a public water supply agency will be receiving the treated 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.

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 4, the chemical-specific ARARs for the treated water from the VOC treatment plant at this site are the federal and state drinking water standards for VOCs set forth in Table 2. Alternative 5 must meet the standards set forth in Table 2 as well as state reinjection standards. 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 chemical-specific ARARs 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).

Implementability. Technically and administratively, Alternatives 2, 3, and 5 could be implemented, although the cooperation of a public water supply agency would be required for implementation of Alternatives 2 and 3. 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 reservations were expressed about alternatives 3, 4 and 5. EPA received comments from water agencies in the area specifically in support of the end use aspects 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 March 21, 1995, the State of California (Cal-EPA) concurred with EPA's selected remedy for the Muscoy Plume OU.

Cost. The estimated total present worth of Alternatives 2, 3 and 5 ranges from $21,500,000 to $30,800,000. The total present worth cost for Alternative 4 is $32,000,000. 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).

The GAC treatment system already operating at the San Bernardino Municipal Water Department's facility at 19th Street and California Avenue may be incorporated into this action and would provide significant cost savings. Construction of pipeline to a distribution system capable of accepting the full volume of treated water would be required.

Selected Remedy.

EPA's comparative analysis of the remedial alternatives against the nine evaluation criteria concluded that Alternative 2 (extraction, treatment by GAC and transfer to public water supply agency) most fully meets the nine criteria. Accordingly, EPA has selected Alternative 2 as the interim remedial action for the Muscoy Plume OU. 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. In addition, EPA recognizes the need for cooperation from a public water supply agency to implement alternatives 2 or 3. Consequently, EPA selects Alternative 5 (extraction, treatment and reinjection into the aquifer) as a contingency if water supply agencies are unable to accept all of the treated water. Section 11 of the ROD provides a detailed discussion of the major components of the selected remedy.

10. APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

This section discusses Applicable or Relevant and Appropriate Requirements (ARARs) for the selected remedy for the Muscoy Plume OU. Section 121(d) of CERCLA requires that remedial actions 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 AKARs, and are legally enforceable and consistently enforced may be ARARs.

An ARAR may be either "applicable", or "relevant and appropriate", but not both. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300, defines "applicable" and "relevant and appropriate" 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, standards 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.

On-site CERCLA actions must comply with the substantive requirements of all ARARs. Off-site activities must comply with both substantive and administrative requirements of all applicable laws. Substantive requirements are requirements that apply directly to actions or conditions in the environment. Examples include quantitative health or risk-based standards for contaminants. Administrative requirements are those mechanisms that assist in the implementation of the substantive requirements (such as reporting, record keeping, and permit issuance), but do not in and of themselves define a level or standard of control. (See 55 Fed. Reg. 8756).

ARARs fall into three broad categories, based on the manner in which they are applied at a site. These categories are as follows:

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. Drinking water maximum contaminant levels (MCLs) are examples of chemical-specific ARARs.

Location-Specific ARARs. Location-specific ARARs are federal and state restrictions placed on the concentration of a contaminant or on activities to be conducted because they are in a specific location. Examples of restricted locations include flood plains, wetlands, historic places, and sensitive ecosystems or habitats.

Action-Specific ARARs. Action-specific ARARs are technology- or activity-based requirements which determine how a remedial action must be performed. Examples are Resource, Conservation and Recovery Act (RCRA) regulations for hazardous waste treatment, storage or disposal.

Neither CERCLA nor the NCP 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 ARARs that apply to the interim remedial action at this site:

10.1 Chemical-Specific ARARs

The chemical-specific ARARs for the contaminants of concern at the Muscoy Plume OU are set forth in Table 2 and discussed in the following sections.

10.1.1 Federal Drinking Water Standards

Safe Drinking Water Act (SDWA), 42 U.S.C. S300f et seq., National Primary Drinking Water Regulations, 40 CFR Part 141.

Federal MCLs and MCLGs

EPA has promulgated Maximum Contaminant Levels (MCLs) under the Safe Drinking Water Act (SDWA) to protect public health from contaminants that may be found in drinking water sources. Although these requirements are only applicable at the tap for water provided directly to 25 or more people or which will be supplied to 15 or more service connections, they are relevant and appropriate to water that is a current or potential source of drinking water. Because the treatment plant effluent from the Muscoy Plume OU is a potential source of drinking water, EPA has determined that the federal MCLs for the VOCs and any more stringent State of California MCLs for these VOCs are relevant and appropriate to the treatment plant effluent. In accordance with NCP section 300.430(e)(2)(i)(B), EPA has also concluded that non-zero Maximum Contaminant Level Goals (MCLGs) are also relevant and appropriate to treatment plant effluent from the Muscoy Plume OU which may be served as drinking water.

The Muscoy Plume OU is an interim remedial action designed primarily to inhibit the spread of contamination. Consequently, chemical-specific requirements for the ultimate cleanup of the aquifer, which would be ARARs for a final remedy, are not ARARs for this interim action. (See 55 Fed. Reg. 8755.)

Under Alternatives 2 and 3, EPA will transfer the treated groundwater to a public water supply agency. EPA considers the subsequent serving of the water by the public supply agency (at the tap) to be an off-site, post-remedy activity. Consequently, if the treated water is served as drinking water, all legal requirements for drinking water in existence at the time the water is served will have to be met. Since these requirements are not ARARs, they are not "frozen" as of the date of the ROD. Rather, they can change over time as laws and regulations applicable to drinking water change.

10.1.2 State Drinking Water Standards

California Safe Drinking Water Act, Health and Safety Code, §4010 et seq., California Code of Regulations, Title 22, Division 4, Chapter 15, §64401 et seq.

California Maximum Contaminant Levels (MCLs): 22 CCR 64444.5

The State of California has established drinking water standards for sources of public drinking water, under the California Safe Drinking Water Act, Health and Safety Code Sections 4010 et seq. California MCLs for VOCs are set forth at 22 CCR 64444.5. 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 Muscoy Plume OU interim remedy. The VOCs for which there are more stringent state standards include cis-1,2-dichloroethene (DCE). 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-dichloroethane (DCA).

California Secondary Drinking Water Standards (SDWS): 22 CCR 64471

The State of California has also promulgated Secondary Drinking Water Standards (SDWS) applicable to public water system suppliers, which address the aesthetic characteristics of drinking water. See 22 CCR §64471. Although California SDWS are not applicable to non-public water system suppliers, the California SDWS are relevant and appropriate to the Muscoy Plume OU interim action if the treated water is transferred to a public water supply agency for distribution. It should be noted that federal SDWS have not been identified as ARARs for this action because they are not enforceable limits and are intended as guidelines only. 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 for the contaminants of concern at the Muscoy Plume OU. If the treated water is recharged or (temporarily) discharged to surface waters, the water will not be required to meet State SDWS.

Table 2. Chemical -Specific Applicable or Relevant and Appropriate Requirements at the Muscoy Plume Operable Unit for Treated Water Transferred to Public Water Supply Agency

Compound	ARAR (µg/l)	ARAR (Regulation)
1,1 Dichloroethane (DCA)	5	California MCL
cis-1,2-Dichloroethene (DCE)	6	California MCL
Trichloroethene (TCE)	5	Federal MCL
Tetrachloroethene (PCE)	5	Federal MCL
Dichlorodifluoromethane (Freon 12)	--	--
Trichlorofluoromethane (Freon 11)	150	California MCL

Notes:

MCL = Maximum Contaminant Level
"__" indicates that no non-zero MCL, MCLG or SDWS has been promulgated

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10.2 Location-Specific ARARs

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

10.3 Action-Specific ARARs

The action-specific ARARs for the Muscoy Plume OU interim remedy are as follows:

10.3.1 Air Quality Standards

Clean Air Act, 42 U.S.C. §7401 et seq.; California Health & Safety Code §39000 et seq.

South Coast Air Quality Management District Rules 401, 402, 403, 1301-13, 1401

The Muscoy Plume OU alternative treatment of VOCs by air stripping, whereby the volatile chemical compounds are emitted to the atmosphere, triggers action- specific ARARs with respect to air quality.

The Clean Air Act, 42 U.S.C. §7401 et seq., and California Health & Safety Code §39000 et seq., regulate air emissions to protect human health and the environment, and are the enabling statutes for air quality programs and standards. The substantive state and federal ambient air quality standards 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, consisting of Rule 1401, on new source review of carcinogenic air contaminants is applicable for the Muscoy Plume OU. SCAQMD Rule 1401 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 x 10-5). EPA has determined that this T-BACT rule is applicable for the Muscoy Plume OU because carcinogenic 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 applicable to the Muscoy Plume OU.

The SCAQMD also has rules limiting the visible emissions from a point source (Rule 401), prohibiting discharge of material that is odorous or causes injury, nuisance or annoyance to the public (Rule 402), and limiting down-wind particulate concentrations (Rule 403). EPA has determined that these rules are also applicable to the Muscoy Plume OU interim remedy.

10.3.2 Water Quality Standards for Reinjection to the Aquifer

If any treated water is reinjected to the aquifer, the treated water must meet all state and federal action-specific ARARs for such reinjection. The ARARs applicable to reinjection (Alternative 5) are as follows:

Federal Reinjection Standards

Federal Underground Injection Control Regulations: 40 CFR 144.12 - 144.13

The Safe Drinking Water Act, 42 U.S.C. §300f et seq., provides federal authority over injection wells. The Federal Underground Injection Control Plan, codified at 40 C.F.R Part 144, prohibits injection wells such as those that would be located at the Muscoy Plume OU 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 withdram 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 Muscoy Plume OU treated water that is reinjected into the aquifer.

Resource Conservation and Recovery Act §3020, 42 U.S.C. §6939b

Section 3020 of the Resource Conservation and Recovery Act (RCRA) is also applicable to the Muscoy Plume OU interim action. 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 Reinjection Standards

State Water Resources Control Board Resolution 68-16.

State Water Resources Control Board Resolution No. 68-16, which is incorporated in the Santa Ana Regional Water Quality Control Board's Water Quality Control Plan for the Santa Ana River (and specific Bunker Hill sub-basins), is applicable to the Muscoy Plume OU interim action to the extent that treated water is reinjected into the aquifer. Resolution 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.

The EPA Region IX Regional Administrator's decision in the matters of George Air Force Base and Mather Air Force Base (July 9, 1993) sets forth a balancing process to be used on a case-by-case basis to determine reinjection standards for treated groundwater under Resolution 68-16. This process requires that the following three factors be balanced in order to determine the permitted discharge level: (1) site-specific considerations, including the hydrogeologic conditions at the site, the contaminants discharged, the quality of the receiving water and the designated beneficial uses of the receiving water; (2) treatment technologies; and (3) cost.

Based upon the balancing process set forth in this decision and on a site-specific analysis of the Muscoy Plume OU, EPA has concluded that the substantive reinjection standard for PCE, DCE, TCE, and DCA at the Muscoy Plume OU will be 0.5 ppb on a monthly median basis for each compound. This conclusion is based on data gathered over the last several years at existing state-funded groundwater treatment plants operating at the leading edge of the contaminant plumes of the Newmark Superfund Site. This site-specific information shows that contaminant levels in the groundwater remain within a range that has been consistently treated to below 0.5 ppb

TCE/PCE/DCE/DCA using conventional treatment technologies (Granular Activated Carbon and Air-Stripping). The cost, operating and water quality data from these existing treatment plants leads EPA to believe that the 0.5 ppb level can be effectively and economically attained on a monthly median basis assuming essentially identical conditions in the Muscoy Plume remedial action. EPA's analysis relies on data from the existing treatment plants and assumes that EPA will be reinjeering the treated water into relatively clean groundwater at or near the edge of the contaminant plume.

Based on data from existing treatment plants as well as industry-wide treatability studies, EPA has concluded that neither freon 11 nor freon 12 can be treated effectively and economically by liquid-phase or vapor-phase granular activated carbon. More importantly, EPA's Risk Assessment for this Operable Unit shows no increased risk to human health and the environment from freon at this site. EPA has concluded that the reinjection standards for freon 11 is the MCL for freon 11 (150 ppb). It should be noted that the maximum concentration of freon 11 and freon 12 detected in the Muscoy Plume investigation area was 4 ppb for freon 11 and 28 ppb for freon 12.

10.3.3 Water Quality Standards for Temporary Discharges to Surface Water

National Pollutant Discharge Elimination System Program (NPDES)

EPA anticipates that there may be incidental, short-term discharges of groundwater to the San Bernardino County flood control channel or to the City of San Bernardino storm drains during certain remedial activities (for example, during construction of the groundwater extraction system, the VOC treatment plant, and the monitoring wells, during groundwater sampling, and during system maintenance). The ARAR for any groundwater 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 Santa Ana Regional Water Quality Control Board (SARWQCB). Based on the waste discharge limitations adopted by the SARWQCB in Order No. 91-63-043, EPA has determined that groundwater that will be discharged, on a short-term basis, to surface waters on-site must meet state or federal MCLs (whichever is more stringent) for PCE, TCE, DCE, and DCA.

10.3.4 Hazardous Waste Management

California Hazardous Waste Control Act, Health & Safety Code, Division 20, Chapter 6.5

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 hazardous waste regulations in the California Code of Regulations (CCR), Title 22, Division 4.5 are now cited as ARARs instead of the federal RCRA regulations.

Under 22 CCR Section 66261.31, certain "spent" halogenated solvents, including TCE and PCE, are listed hazardous wastes (RCRA waste code F002). Although TCE, PCE and certain other halogenated solvents are the contaminants of concern in the groundwater at the Muscoy Plume OU, the source of these contaminants has not yet been determined, and the contaminants cannot therefore be definitively classified as listed RCRA hazardous wastes. However, the contaminants are sufficiently similar to listed RCRA hazardous wastes that EPA has determined that portions of the state hazardous waste regulations are relevant and appropriate to the Muscoy Plume OU interim action.

VOC Treatment Plant Requirements: 22 CCR §§ 66264.14, 66264.18, 66264.25, 66264.600-.603, and 66264.111-.115

The substantive requirements of the following general hazardous waste facility standards are relevant and appropriate to the VOC treatment plant: 22 CCR Section 66264.14 (security requirements), 22 CCR Section 66264.18 (location standards) and 22 CCR Section 66264.25 (precipitation standards).

In addition, an air stripper or GAC contactor would qualify as a RCRA miscellaneous unit if the contaminated water constituted RCRA hazardous waste. EPA has determined that the substantive requirements for miscellaneous units set forth in Sections 66264.600 -.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 and the air stripper or GAC contactor appear to qualify as miscellaneous units. Consequently, 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.

Certain other portions of the state's hazardous waste 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.

Land Disposal Restrictions: 22 CCR §66268

The land disposal restrictions (LDR) set forth in 22 CCR Section 66268 are relevant and appropriate to on-site disposal of contaminated groundwater on land. The remedial alternatives presented do not include on-site land disposal of untreated groundwater, except as may occur through activities incidental to the remedial activity, such as purging monitoring wells. Any water discharged to land must meet state or federal MCLs, whichever is more stringent, prior to discharge. Such water would not constitute a RCRA hazardous waste and would therefore not trigger LDRs.

The LDRs set forth in 22 CCR 66268 are also relevant and appropriate to the on-site disposal of spent carbon on land. These restrictions would be applicable if the spent carbon contains sufficient quantities of hazardous constituents to render it a characteristic hazardous waste. However, the remedial alternatives presented do not contemplate on-site disposal of spent carbon on land and are therefore unlikely to trigger LDRs.

Storage Requirements: 22 CCR §§66262.34, 66264.170 - 66264.178

The container storage requirements in 22 CCR Sections 66264.170 -.178 are relevant and appropriate for the on-site storage of contaminated groundwater or spent carbon over 90 days. The substantive requirements of 22 CCR Section 66262.34 are relevant and appropriate for the on-site storage of contaminated groundwater or spent carbon for less than 90 days. These requirements would be applicable if the contaminated groundwater or the spent carbon contained sufficient quantities of hazardous constituents to render them characteristic hazardous wastes.

10.4 Other Performance Standards

The NCP authorizes EPA and the state to identify advisories, criteria, guidance or proposed standards to-be-considered (TBCs) that may be helpful or useful in developing CERCLA remedies. NCP, 40 CFR Sections 300.400(g)(3) and 300.430(b)(9). Such TBCs are identified in the RI/FS and may be selected by EPA as requirements for the remedial action in the ROD.

EPA has determined that certain substantive standards for the construction of public water supply wells published by the State of California (the California Water Well Standards) and identified as TBCs in the RI/FS should be requirements for the Muscoy OU interim remedy. 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 Muscoy Plume OU interim remedy involves transfer of the treated water to the public water supply agency, EPA has determined that the remedial 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 remedial action is dependent upon the well locations. Additionally, wells constructed solely for treatment and reinjection with no delivery to the public supply water system will not be subject to these water well construction standards.

11. 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 supply agency, is the most appropriate interim remedy for the Muscoy Plume OU. If the public water supply agency does not accept any or all of the treated water, then Alternative 5: extraction, treatment of VOCs, and recharge to the aquifer, will be implemented.

Alternative 2 involves groundwater extraction (pumping) of approximately 6,200 gallons per minute (gpm) near the leading edge of the plume for a period of 30 years. The actual design capacity of the extraction and treatment facilities will be determined during the Remedial Design phase based on refined groundwater information and modeling. The RI/FS Report analysis indicated that the final extraction rate is expected to be within the range of 5,000 gpm to 7,000 gpm. Individual wells would pump from 800 to 2,000 gpm, the range for a typical city drinking water well. 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.

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 (December 1994) 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. Existing treatment facilities (e.g., the GAC treatment system at the 19th Street wellfield) may be modified and incorporated into the remedy as appropriate. The VOC treatment technology which best meets the objectives of the remedy for the Muscoy Plume 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 applicable or relevant and appropriate MCLs, non-zero MCLGs 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 agency for distribution. Construction of pipeline to a distribution system capable of accepting the full volume of treated water would be required. It may be possible to use an existing treatment plant site with construction of pipeline to the plant and from the plant to the distribution pipeline.

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 agency 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 state reinjection standards and final use of the treated water, the extraction, treatment and monitoring components of Alternative 5 are identical to Alternative 2 above.

The total duration of the Muscoy Plume OU interim remedy will be approximately 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 Muscoy Plume 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 Muscoy Plume 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 March 21, 1995, the State of California concurred with EPA's selected remedy. EPA received several public comments during the public comment period, the majority of which generally expressed support for Alternatives 2 through 5, although reservations were expressed about alternatives 3, 4 and 5. EPA received comments from water agencies in the area specifically in support of the end use aspects of alternatives 2 and 3. 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 agency 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 $26,000,000, which is in the middle of the range for all five alternatives. The estimated total cost of Alternative 5 is $30,800,000.

12. 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. DOCUMENTATION OF SIGNIFICANT CHANGES

No significant changes to EPA's preferred alternative resulted from comments received during the public comment period.

PART III. RESPONSIVENESS SUMMARY

For PUBLIC COMMENTS RECEIVED from

DECEMBER 14, 1994, through JANUARY 20, 1995

ON THE PROPOSED PLAN FOR THE

MUSCOY PLUME OPERABLE UNIT INTERIM REMEDIAL ACTION

AT THE NEWMARK GROUNDWATER CONTAMINATION SUPERFUND SITE,

SAN BERNARDINO, CALIFORNIA

This section summarizes and responds to all significant comments received during the public comment period (38 days) on EPA's proposed interim cleanup plan for the Muscoy Plume Operable Unit of the Newmark Groundwater Contamination Superfund Site in San Bernardino, California. This summary is divided into two parts. Part 1 provides a summary of the major issues raised in written comments contained in three letters received by EPA during the comment period. Part 2 summarizes the questions and comments made during the public meeting on the Proposed Plan held in San Bernardino on January 10, 1995. Copies of all the written comments received by EPA are included in the Muscoy Plume OU Administrative Record, available for review at the information repositories for the Newmark Superfund Site. The transcript of the public meeting, including all the questions and comments made during the meeting, is also available at the information repositories.

1. WRITTEN COMMENTS

1) Commenter (San Bernardino Valley Water Conservation District) emphasizes that, "..it is imperative that the Muscoy plume, as well as the other contaminant plumes, be cleaned up as rapidly as possible." Commenter provides estimate of water in storage in the basin an estimate of volume contaminated.

EPA response: EPA appreciates this expression of support for the interim action at the Muscoy plume. Reaction to a hazardous chemical release must balance the need for rapid response with careful data gathering and analyses. During this project, EPA has maintained a bias toward timely action (such as the Muscoy Plume Interim Action) and will continue to seek opportunities to streamline the process.

2) Commenter recommends consideration of spreading the treated water in an existing gravel pit in the Lytle Creek area as an alternative to reinjection. Commenter notes that reinjection is a costly alternative.

EPA response: Recharge of treated water to the aquifer will only be considered as a contingency in the event that acceptance by water supply agencies cannot be negotiated. EPA expects that these negotiations will be successful. The Feasibility Study did not identify existing gravel pits suitable for spreading (recharging) water all year round at the volumes necessary to meet the objectives of the Muscoy Plume OU.

3) Commenter (California Regional Water Quality Control Board, Santa Ana Region) expresses support for Alternatives 2 and 3 (Extraction and treatment using Granular Activated Carbon or air-stripping technology). Commenter also emphasizes the importance of protecting downgradient water supply wells.

EPA response: EPA appreciates the careful review and expression of support.

4) Commenter (West San Bernardino Valley Water District) expresses interest in accepting treated water from the cleanup project at a reasonable price if all federal and state water quality requirements are met. This letter was forwarded from the City of San Bernardino Municipal Water Department which is coordinating local water supply agency negotiations to accept treated water from the Newmark Superfund Site interim remedial actions.

EPA response: The active participation of local water supply agencies in the Muscoy Plume OU

and the Newmark Superfund Site in general is respectfully acknowledged. Support of the proposed alternative by the water supply agencies of the community is important in the selection of the remedy for this Operable Unit.

2. COMMENTS FROM PUBLIC MEETING HELD JANUARY 10, 1995

Lee Brandt (written and oral comment)

5) Commenter notes that he had played around Camp Oho (potential source area) as a child and has developed serious health problems. Commenter recommends public notice be given to people who played in the area that they were exposed to carcinogens.

EPA response: This comment is about the source and does not directly address the Muscoy Plume interim action. The State of California and EPA searched extensively for surface contamination throughout the potential source area but did not detect any remaining VOCs. Since the contaminants of concern are quite volatile, it would be unusual to detect any significant surface contamination even a year or two after the release. Our analyses do not indicate any current exposure except through untreated groundwater, and the state and local water supply agencies prevent untreated contaminated water from entering the water supply system. Your suggestion about addressing past exposures has been forwarded to the Agency for Toxic Substances and Disease Registry (ATSDR). They have been requested to contact you directly.

Jeff Wright

6) Commenter objects to operation of existing air-stripping towers (at Newmark OU) without emission control systems in light of possible restrictions on backyard barbecues in the region as a result of air quality issues.

EPA response: This comment is indirectly pertinent to the Muscoy Plume OU, in that air-strippers are considered a possible treatment technology for the contaminated groundwater. EPA has committed to meeting the South Coast Air Quality Management District's omission control requirements if this technology is used. The existing air-stripping towers at the Newmark and Waterman wellfields in San Bernardino meet the applicable air quality requirements. Studios conducted by the City of San Bernardino have concluded that current emissions do not pose a health hazard. The comparison of risk from the untreated air omissions versus the risk from partially combusted charcoal from all of the backyard barbecues in San Bernardino is an issue beyond the scope of this Superfund project.

7) Commenter suggests that permitting of the Newmark air-strippers without emission control systems is a breakdown of the environmental regulatory process.

EPA response: As noted above, the existing treatment systems in San Bernardino meet the applicable air quality requirements. Studies conducted by the City of San Bernardino have concluded that current emissions do not pose a health hazard. EPA has committed to meeting the South Coast Air Quality Management Districts emission control requirements if the air-stripping technology is used.

8) Commenter feels that regulators have been incapable of preventing the San Bernardino aquifer from being contaminated by two or more Superfund sites.

EPA response: Aquifers like the one beneath San Bernardino are vulnerable to releases of contaminants to the soil surface. It is important to recognize that contamination of the aquifer is believed to have originated more than 20 years ago, from sources that are not likely to reoccur given current regulation of hazardous substances.

Frank Vera

9) The commenter notes that it is misleading to have separate names for the Newmark and Muscoy Plume OUs, when the problem is actually the Camp Ono Contaminant Plume.

EPA response: Operable units are discrete actions that comprise incremental steps toward a comprehensive solution for the entire site. Despite the complexity of the Newmark Superfund Site geology and the difficulties inherent in investigating groundwater contamination 500 feet

beneath an urban area, EPA was able to show that the Newmark plume and the Muscoy plume originate from the same area. It has not been established which of several potential sources are responsible for the contamination, and it would be premature to declare this the Camp Ono site.

10) The commenter feels that EPA has made their presentation as if EPA were doing the public a favor when EPA is actually required by law to address the contamination. In addition the commenter believes that there has not been sufficient effort to uncover the real sources (Manhattan Project, Ethyl Corporation, Kaiser Steel, Culligan Zeolite).

EPA response: The record is clear that EPA is responding to the Newmark site in accordance with the requirements of the CERCLA statute and the National Contingency Plan (NCP) regulations. All the potential sources mentioned as well as many others have been considered by EPA. After analysis of the information gathered to this point, EPA has decided not to pursue the sources mentioned since the nature of chemical usage, location, time frame of operation or a combination of these factors are not consistent with the location and nature of the Newmark Superfund Site groundwater contamination. For example, the Ethyl Corporation facility was located near the leading edge of the Muscoy plume and the pattern of contamination shows that the plume originated miles to the northwest of this facility.

11) The commenter asserts that the source is the former military base (Camp Ono) and the federal government should be cleaning it up. The commenter further states that the source is actually a major military complex that wraps all around the Shandin Hills and includes a former Naval hospital northeast of the Shahdin Hills.

EPA response: EPA's investigation into the source (the Source OU) is focusing on the general area of the former San Bernardino Engineering Depot (Camp Ono), although other origins cannot be ruled out. The pattern of contamination is not consistent with releases from potential sources north and east of the Shandin Hills. The pattern of contamination is also inconsistent with releases from the WWII incendiary manufacturing operation southeast of Camp Ono (often referred to as the "bomb plant").

12) The commenter feels that more emphasis must be paid to a secret pre-Manhattan (nuclear weapons) military project at the "Bomb Plant Complex".

EPA response: The San Bernardino Engineering Depot (Camp Ono) was an operation of the Corps of Engineers and the Quartermaster Corps during WWII on land leased from private parties. EPA has no credible evidence that any secret research went on there. All the wells in the area show the same low levels of naturally occurring radiation, including wells several miles upgradient of the depot and in portions of the basin hydrologically isolated from any potential influence from the depot.

13) The commenter is concerned that the groundwater had been contaminated and people were exposed to hazardous chemicals for 30 to 40 years because the bomb plant complex was kept secret.

EPA response: State and local water supply agencies responded immediately when the groundwater contamination (by VOCs) was discovered as part of a statewide Department of Health Services initiative to test groundwater for unexpected solvents. The state's investigation at that time discovered contamination in a number of other basins unrelated to military bases. See previous responses concerning past exposures (Comment #5) and evidence of military operations (Comments #9, 11 and 12).

John Stevens

14) The commenter feels that EPA has not taken radioactive contamination seriously, since the Newmark Superfund Site contamination seems like the same problem as Norton Air Force Base which does have radiation problems and chlorinated solvents together.

EPA response: (See response to Comments #11 and 12 above)

15) The commenter expresses doubt and frustration that the VOC contaminant levels reported in the EPA Remedial Investigation Report and related sampling reports are in parts per million rather than parts per billion. The commenter is concerned that the true concentrations are in

parts per million and that these levels would cause problems with adequate treatment. The commenter reasons that EPA would not be proposing an action if the contaminants were really in the parts per billion since, "...then it wouldn't be a real problem."

EPA response: All EPA documents show that the contaminant levels of VOCs at the Newmark Superfund Site have been in the microgram per liter (parts per billion) range. Drinking water standards for both PCE and TCE are 5 micrograms per liter (parts per billion). EPA is concerned about contamination at this level and is responding to this release in order to meet the drinking water standards.

16) The commenter insists that more effort needs to be expended on explaining what was really going on at the 2700 acre complex at Camp One. He suggests that uranium tetrachloride was produced at the base, and that the nearby Ethyl Corporation was involved in producing tetrachlorides and ethylene as well as deuterium needed for nuclear activities.

EPA response: EPA is conducting a thorough subsurface investigation in the Camp One area. EPA is continuing to work with the Department of Defense to provide a more detailed account of activities at the former depot. The history of the San Bernardino Engineering Depot is available in the Administrative Record. The Army leased 1600 acres and all leases ended by 1947. See previous responses concerning radioactivity (Comment #12) and involvement of other facilities in the area (Comment #11).