



# Proposed Plan for Operable Unit 5/ IR-02 Groundwater, Former NAS Alameda and Alameda Annex (FISCA)

Alameda, California

March 2006

## U.S. NAVY ANNOUNCES PROPOSED PLAN

The U.S. Navy requests public comments on proposed actions to clean up shallow groundwater at Operable Unit 5/IR-02 sites. Operable Unit (OU) 5 Installation Restoration (IR)\* sites are located on the former Naval Air Station (NAS) Alameda on Alameda Point. Site IR-02 (and nearby sites) are located to the east on the adjacent Fleet and Industrial Supply Center Oakland, Alameda Facility/Alameda Annex (FISCA), which is referred to as the Annex in this Proposed Plan (Figure 1). The U.S. Environmental Protection Agency (EPA), California EPA Department of Toxic Substances Control (DTSC), and San Francisco Bay Regional Water Quality Control Board (RWQCB) worked with the Navy in the evaluation of all of the alternatives and in the selection of the preferred alternative.

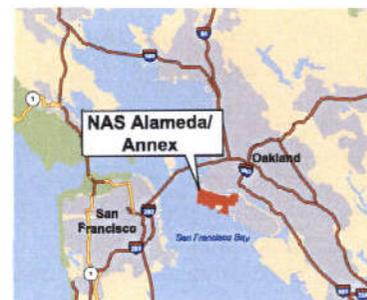
This Proposed Plan announces the Navy's preferred alternative to address contaminated shallow groundwater at OU-5/IR-02, where benzene and naphthalene are the groundwater contaminants. There are no drinking water wells on the OU-5/IR-02 sites. The contaminated groundwater underlies the George P. Miller Elementary School, the Woodstock Child Development Center, United States Coast Guard (USCG) Housing at North Village and Marina Village, and adjacent Annex areas. Evaluations of groundwater contamination show that there is no immediate risk to children, residents or others in these areas. The preferred alternative will address potential long-term risks. The Navy proposes to clean up contaminated groundwater by:

- Introducing air as an oxygen source (biosparging) to accelerate biodegradation of contaminants
- Capturing and treating potential escaping vapors during biosparging to prevent site

occupants from being exposed to vapors

- Adding nutrients to feed microorganisms, as required
- Monitoring the biodegradation by conducting sampling to ensure that the remedy is effective and is being completed according to the Record of Decision (ROD)

This Proposed Plan summarizes the alternatives evaluated per the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and explains the basis for choosing the preferred alternative.



**Figure 1. Former NAS Alameda/Annex Location**

**- NOTICE -**

**Public Comment Period**

**March 6 through  
April 4, 2006**

**Public Meeting**

**March 15, 2006**

**Alameda Point  
Main Office Building, Room 201  
950 West Mall Square  
Alameda, California**

**6:30 to 8:00 p.m.**

## THE CERCLA PROCESS

The Navy is issuing this Proposed Plan as part of its public participation responsibilities under Section 117(a) of CERCLA and Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The flowchart to the right illustrates the current status of OU-5/IR-02 in the CERCLA process.

This Proposed Plan summarizes information detailed in the Remedial Investigation/ Feasibility Study (RI/FS) report and other documents contained in the administrative record file for this site. The Navy encourages the public to review these documents to gain an understanding of the environmental assessment and investigation activities that have been conducted. The documents are available for public review at the locations listed on page 10.

A public comment period will be held from March 6 through April 4, 2006, and public comments can be submitted via mail, fax or e-mail throughout the period. A public meeting will be held on March 15, 2006 at Alameda Point, 950 West Mall Square, Room 201 from 6:30 to 8:00 p.m. Members of the public may submit written and oral comments on this Proposed Plan at the public meeting. Comments must be provided no later than April 4, 2006.

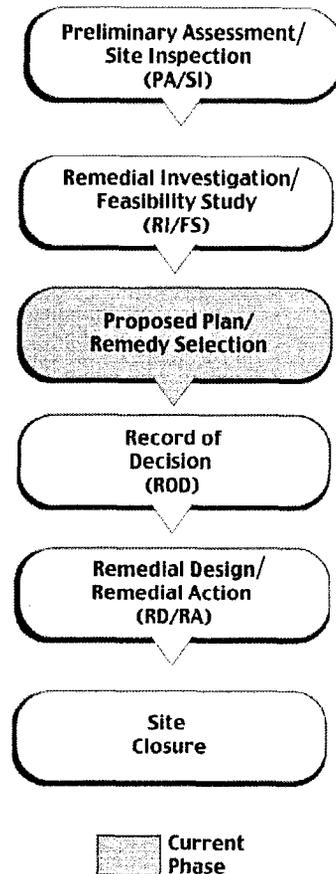
In consultation with the regulatory agencies, the Navy may modify the preferred alternative or select another cleanup remedy based on feedback from the community or on new information. Therefore, the community is strongly encouraged to review and comment. A final decision will not be made until all comments are considered.

## SITE DESCRIPTION AND BACKGROUND

The former NAS Alameda is located on Alameda Point (Figure 1) and ceased operations in 1997. The Annex is located to the east of the former NAS Alameda and ceased operations in 1998. The OU-5/IR-02 area has been in continuous use since the early 1930s when it was part of the San Francisco Bay Airdrome. Aircraft maintenance hangars and buildings were located east of IR-02; however, within the OU-5/IR-02 area there were potential releases of aircraft-related contaminants.

Alameda Point is relatively flat land created by filling tidelands, marshlands, and sloughs in the

## COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT (CERCLA) PROCESS



early 1900s. From the late 1800s until the 1920s, two gas plants, an oil refinery, and other manufacturing businesses were located near the present-day site. These facilities may have discharged gas plant and refinery wastes along the sides of tidal channels and on the surface of marshlands. As the marshlands and intertidal areas were filled in, the discharged gas plant and refinery wastes may have become entrapped, creating what is now referred to as the Marsh Crust.

The Marsh Crust layer consists of entrapped petroleum wastes that contain polynuclear aromatic hydrocarbons (PAHs). Along with possible point sources, it is suspected that contamination trapped in the Marsh Crust may be contributing to the contaminants observed in OU-5/IR-02 groundwater.

As shown in Figure 2, six IR sites at the former NAS Alameda and the Annex are included in the OU-5/IR-02 area. OU-5 was previously

referred to as Alameda Point Site 25 in some reports, including the RI/FS.

The approximate estimated extent of the contaminated shallow groundwater beneath these sites lies within the dashed area and is referred to as a plume. The depth to shallow groundwater at OU-5/IR-02 sites ranges from two to ten feet below ground surface (bgs). Contamination is only within the shallow groundwater in fill material above a layer known as the Bay Mud. The Bay Mud forms a layer called an aquitard that restricts the shallow groundwater from flowing downward to deeper water-bearing zones. The shallow groundwater has a lateral flow direction that is variable, but is generally north to northwest, toward Oakland's Inner Harbor.

There are no drinking water wells installed at these sites, and water service in this area is provided by the East Bay Municipal Utility District (EBMUD) from a separate source. Portions of the groundwater within the plume underlying these sites are designated a potential drinking water source in the San Francisco Bay Basin Water Quality Control Plan (Basin Plan). Because of saltwater intrusion and naturally high total dissolved solids, it is unlikely that the shallow groundwater beneath the OU-5/IR-02 area would be used as a potential source of drinking water. In June 1999, the RWQCB issued a letter that stated the shallow groundwater at the Annex meets the exemption criteria in the State Water Resources Control Board (SWRCB) Resolution

No. 88-63 and RWQCB Resolution No. 89-39, and it is unlikely that the shallow groundwater would be used as a potential source of drinking water.

As shown on Figure 2, the three Alameda Point IR sites in OU-5 are Sites 25, 30, and 31. The three Annex sites are IR-01, IR-02, and IR-03. Because the majority of IR-02 is within the estimated plume boundary and for brevity, the other Annex sites are not included in the title. This plan is referred to as the OU-5/IR-02 Groundwater Proposed Plan. This Proposed Plan addresses the contaminated shallow groundwater beneath the six sites and within the approximate plume boundary (see Figure 2). These six sites are described below:

- **Alameda Annex IR-01** – This site is located on the south side of the Annex and is a former warehouse area.
- **Alameda Annex IR-02** – This site is located on the south-central side of the Annex. The Defense Logistics Agency Defense Reutilization and Marketing Office operated a screening lot and scrap yard at IR-02 until 1997. The western portion of IR-02 was used as a screening lot and for temporary equipment storage. The eastern portion of IR-02 was used as a scrap yard and for temporary storage of discarded automobiles, stockpiled scrap metal, and surplus equipment.
- **Alameda Annex IR-03** – This site is located on the west side of the Annex. Annex IR-03

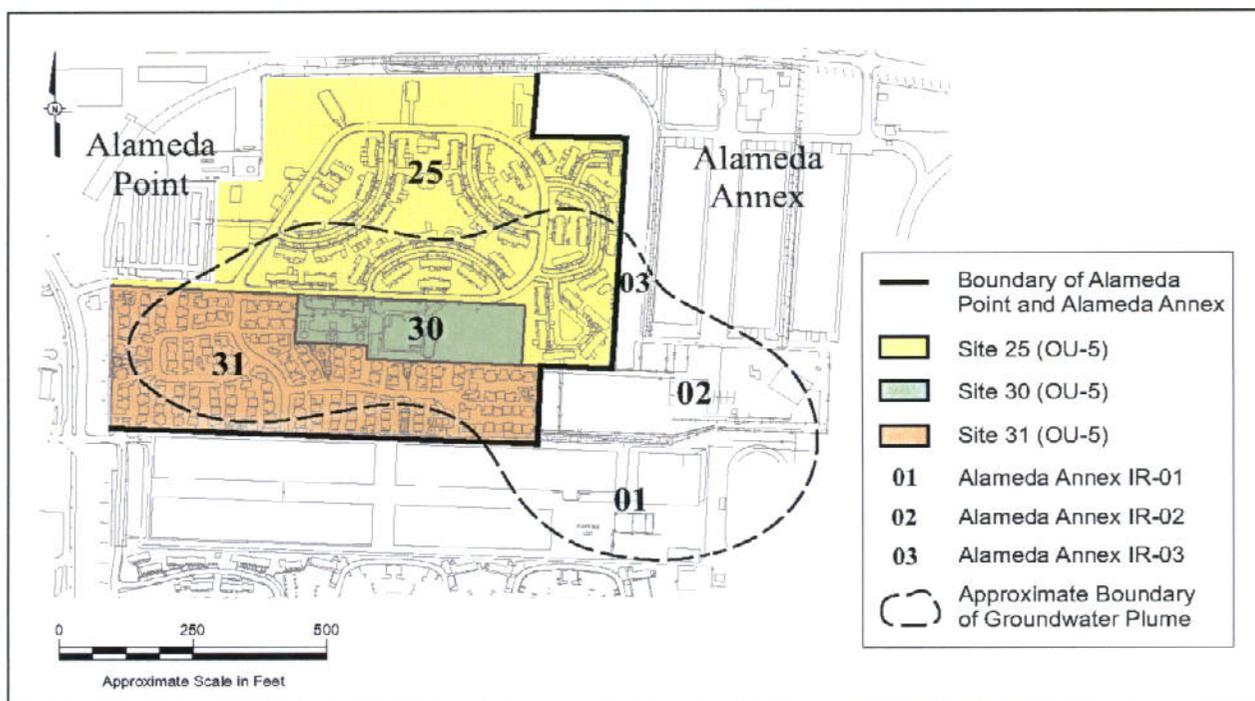


Figure 2. Layout of OU-5/IR-02

formerly consisted of an automotive drive-up maintenance rack over an asphalt-paved area.

- **Site 25** – This site is part of OU-5 and is located on the northeast side of Alameda Point. Site 25 includes the USCG North Village Housing, the Estuary Park, and the USCG Housing Maintenance Office.
- **Site 30** – This site is part of OU-5 and is located on the northeast side of Alameda Point. Site 30 includes the George P. Miller Elementary School and the Woodstock Child Development Center.
- **Site 31** – This site is part of OU-5 and is located on the northeast side of Alameda Point. Site 31 includes USCG Marina Village residential housing.

## SITE INVESTIGATIONS

The determination of the beneficial uses of groundwater is provided in a report dated July 2000, which states "...the BRAC cleanup team (BCT) has concluded that groundwater beneath Site 25 is unlikely to be used as a drinking water source..." Groundwater at the site is not currently used for drinking water, irrigation, or as an industrial supply. Water service in the area is provided by EBMUD from a separate source.

In 2002, the USCG performed a risk assessment for the USCG Marina Village residential housing and the USCG North Housing to evaluate potential health risks associated with migration of vapors from volatile chemicals in groundwater to indoor air. The risk assessment used soil gas and groundwater data from historical investigations as well as data from air samples collected for the USCG report.

The results of the USCG evaluation using outdoor, indoor, and crawl space air samples indicate that there is no evidence of accumulation of vapors from groundwater contaminants in indoor air. Indoor air concentrations were similar to outdoor air concentrations. Also, the indoor air concentrations for homes with vapor barriers (Marina Village Housing Units) were not different from the concentrations in homes without vapor barriers (North Housing and Kollman Circle). This suggests that chemicals in the indoor air may not originate from soil gas.

The Final Groundwater RI/FS report was completed in 2004 and included the collection

of over 300 groundwater samples. A risk assessment was also conducted as part of this work. Results show that benzene and naphthalene are the contaminants in the shallow groundwater above the risk-based screening level. The contaminated OU-5/IR-02 shallow groundwater underlies an area of approximately 42 acres. Benzene and naphthalene concentrations appear to increase with depth (greatest concentrations at 20 feet bgs). The dissolved benzene and naphthalene are located in the same area, possibly suggesting a common origin. During the remedial design phase, the extent of benzene and naphthalene in groundwater will be refined to reflect the most current site conditions prior to the implementation of the remedy, as specified in the RI/FS report.

Groundwater monitoring is currently being conducted, and results indicate that the concentrations of benzene and naphthalene in the shallow groundwater plume do not appear to be migrating laterally, and are undergoing the slow degradation process that occurs naturally in groundwater. Analytical results for groundwater samples are reported annually as part of the Alameda Point Basewide Groundwater Monitoring Program.

## RISK ASSESSMENT

Within the context of environmental investigations and actions, "risk" can be defined as the likelihood or probability that a hazardous substance, when released to the environment, will cause adverse effects on exposed human or ecological receptors (i.e. those who may be at risk). Risk is further classified as carcinogenic (causes cancer) or non-carcinogenic (causes other illnesses).

To determine if a remedy was required, a human health risk assessment (HHRA) was performed that included multiple exposure pathways. Chemicals detected in site groundwater samples were compared to EPA and DTSC criteria to identify which chemicals were likely to be of concern to human health; two chemicals, benzene and naphthalene, were identified. Benzene contributed approximately 95 percent of the cancer risk when there is no use of groundwater for drinking water.

Risk assessments are designed to provide a margin of safety to protect public health and the environment. Actual human exposures and associated risks are likely to be less than those calculated for the risk assessment because

each input value used in the assessment is conservative.

The Navy used EPA guidance to evaluate the different ways that people might be exposed to the chemicals, the possible concentrations of chemicals that potentially could be encountered in those exposures, and the potential frequency and duration of exposure. Exposure pathways and potential receptors (i.e., those who may be at risk) for OU-5/IR-02 groundwater are shown in Table 1.

**Table 1. Exposure Pathways and Potential Receptors**

- **Direct contact** with shallow groundwater through dermal (skin) absorption: **workers/ residents**
- **Inhalation of contaminants** from water resulting from household use (e.g., showering): **residents (but only if groundwater is used for potable purposes, which is unlikely at present)**
- **Inhalation of vapors** from shallow groundwater in air: **workers/residents/ students**

These exposure pathways are based on current and reasonable future exposure scenarios. The concentrations of chemicals that may be encountered in these exposures is estimated based upon average values. To account for uncertainty that the average values represent chemical concentrations across the area, the upper confidence limit is used to estimate an exposure point concentration (EPC). The potential duration and frequency is estimated by using daily intake over the time of exposure and is expressed as the reasonable maximum exposure (RME).

The Navy used the risk calculation results and EPA/DTSC information on toxicity of each chemical to assess potential health risks. The likelihood of a cancer case resulting from exposure to chemicals is generally expressed as an upper bound probability. For example, a 1 in 10,000 chance is a risk of  $1 \times 10^{-4}$ . In this case, for every 10,000 people, one additional cancer case may occur as a result of exposure. A 1 in 1,000,000 chance is a risk of  $1 \times 10^{-6}$ . In this case, for every 1,000,000 people, one additional cancer case may occur as a result of exposure. In accordance with EPA guidance, the risk management range is  $10^{-4}$  to  $10^{-6}$ . The risk management range was established by EPA to set guidelines for making risk management decisions.

For non-cancer effects, a hazard quotient (HQ) is calculated. A HQ of 1 or greater indicates

that a lifetime of exposure may have potential for causing adverse health effects. The HQ is based upon effects of a single chemical. For multiple chemicals, the HQs are added together to obtain the hazard index (HI). As a useful reference for assessing health effects, the HI is commonly used to express health effects of chemical mixtures.

EPA guidance states "Where the cumulative carcinogenic site risk to an individual based on reasonable maximum exposure for both current and future land use is less than  $10^{-4}$  and the non-carcinogenic hazard quotient is less than 1, action generally is not warranted unless there are adverse environmental impacts. However, if [maximum contaminant levels] MCLs or non-zero [maximum contaminant level goals] MCLGs are exceeded, action generally is warranted." Site-specific factors are also typically considered at sites where the cancer risks are in the  $10^{-4}$  to  $10^{-6}$  range when decisions are being made about whether action will be taken. Cancer risks below  $10^{-6}$  are generally considered insignificant. For cancer risks above the risk management range of  $10^{-4}$  to  $10^{-6}$ , action is generally required.

### Cancer Risk Results

For OU-5/RI-02, the groundwater does not pose an unacceptable cancer risk through incidental exposure (i.e., car washing, landscaping, etc.). The non-drinking water use cancer risk range is  $3 \times 10^{-5}$  to  $2 \times 10^{-6}$ . These cancer risk values are within the risk management range of  $10^{-4}$  to  $10^{-6}$ . As discussed above, site-specific factors are typically considered when decisions are made about whether action will be taken for sites with cancer risks within the risk management range ( $10^{-4}$  to  $10^{-6}$ ). In accordance with input from the regulatory agencies, the Navy also evaluated the risk for the unlikely scenario of groundwater use for drinking water. For the hypothetical residential scenario where groundwater is used by the residents for drinking water, the cancer risks are above the risk management range.

### Non-Cancer Risk Results

Under the non-drinking water use scenarios, the HI ranged from 0.29 to 0.99. Because the entire range is within the acceptable level of less than 1.0, adverse health effects to workers are considered unlikely. Additionally, the potential inhalation by residential and school receptors of possible indoor vapors does not pose an unacceptable risk, and ongoing groundwater

monitoring has demonstrated that ecological receptors are not being exposed to contaminated groundwater from the OU-5/IR-02 sites. In accordance with input from the regulatory agencies, the Navy also evaluated the non-cancer risk for the unlikely scenario of groundwater use for drinking water. For the hypothetical residential scenario where groundwater is used by the residents for drinking water, the non-cancer risk exceeds the acceptable HI.

## ECOLOGICAL RISK ASSESSMENT

An Ecological Risk Assessment (ERA) was conducted for groundwater. The ERA did not find a significant risk to terrestrial ecological receptors. Further, no ecological risk to the San Francisco Bay was identified due to lateral groundwater movement or storm sewer system discharge.

## REMEDIAL ACTION OBJECTIVES

To evaluate remedial alternatives, remedial action objectives (RAOs) are developed. During the FS, the RAOs provide a quantitative means of identifying areas for potential remedial action, for screening the types of appropriate technologies, and for assessing a remedial alternative's ability to achieve site cleanup. Proposed remedial goals are provided in this Proposed Plan and will be established in the ROD. The goals selected in the ROD will be the basis for measuring the success of the groundwater cleanup.

The proposed groundwater RAOs have been selected to protect human health. Human health risks are within the risk management range for current and reasonable future scenarios, and the Navy proposes to reduce contaminant concentrations as a risk management decision, which was made in coordination with the regulatory agencies. The proposed risk-based remedial goals, as presented in the RI/FS report, are:

- **Benzene** – 1.0 microgram per liter ( $\mu\text{g/L}$ ), which is equivalent to the State drinking water standard and lower than the EPA drinking water standard.
- **Naphthalene** – 100  $\mu\text{g/L}$ , which is equivalent to the EPA health advisory for naphthalene. It is likely when the benzene goal is achieved, the concentrations of the co-located naphthalene will be reduced to less than the health advisory concentration.

## SUMMARY OF REMEDIATION ALTERNATIVES

Remedial technologies evaluated ranged from "No Action" to extensive remediation, and were screened and evaluated in the FS. The results of those evaluations are briefly summarized below. Table 2 provides a description of institutional controls (ICs), which are included in each remedial alternative.

**Table 2. Institutional Controls**

Institutional controls described in this Proposed Plan include land use restrictions that would be established to limit human exposure to contaminated shallow groundwater until the risk-based remedial goals in the ROD and applicable or relevant and appropriate requirements (ARARs) have been reached.

Institutional controls are applicable to all alternatives evaluated for groundwater (except Alternative 1, No Action) and will be implemented as soon as feasible.

If the property within OU-5 is transferred to a non-federal entity, the land use restrictions will be incorporated into and implemented through two separate legal instruments:

1. Restrictive covenants included in a "Covenant to Restrict Use of Property" entered into by the Navy and DTSC as provided in tit. 22 Cal Code Regs. Section 67391.1 and consistent with the Navy/DTSC 2000 Memorandum of Agreement.
2. A Quitclaim Deed from the Navy to the property recipient.

If the property within OU-5 is transferred to a federal department or agency, the land use restrictions will be incorporated into a Memorandum of Agreement or similar agreement.

Proposed Land Use Restrictions:

- *Prohibit* alteration, disturbance or removal of Navy extraction, injection, and monitoring wells and associated piping and equipment, any component of a response or cleanup action, or associated utilities without the prior review and written approval of the Navy.
- *Prohibit* extraction of groundwater and installation of new groundwater wells by a non-federal entity until the risk-based remedial goals in the ROD have been reached, unless written approval is obtained from the regulatory agencies and the Navy.
- *Require* the future landowner to gain written approval from the regulatory agencies and the Navy for construction of new buildings until the risk-based remedial goals in the ROD have been reached.

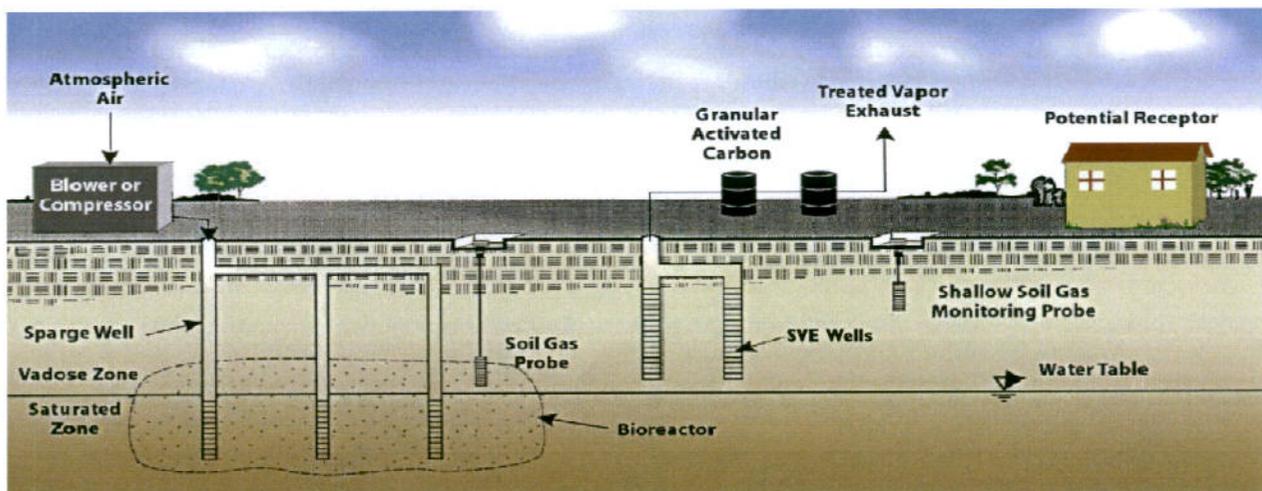
Access provisions are required to ensure the Navy and regulatory agencies have access to remedial equipment and other remedy components for the purpose of implementing the remedial action, performing maintenance activities, and conducting monitoring.

## REMEDIAL ALTERNATIVES

The groundwater FS identified six remedial alternatives. These alternatives are summarized in Table 3. Each alternative, except No Action, has monitoring and ICs as a

component of the alternative. Figure 3 shows the conceptual design for biosparging and air sparging under Alternatives 3, 4, and 5.

Alternative	Description	Time (years)	Cost (Million)
1. No Action	No action is required by CERCLA to be evaluated as an alternative to establish a baseline from which to compare the other alternatives. In this scenario, no actions are performed.	0	0
2. Monitored Natural Attenuation (MNA) and ICs	Monitored Natural Attenuation can be a useful process for addressing contamination in areas that have an abundance of oxygen in groundwater. However, due to reduced natural oxygen in groundwater at this site, natural degradation of the contamination would require many years.	50	2.2
3. Biosparging, Soil Vapor Extraction (SVE), Monitoring, and IC	This alternative introduces air as an oxygen source at a low, controlled flow rate for aerobic degradation, thereby accelerating the naturally occurring biodegradation processes. Biosparging could volatilize some contaminants into the vadose zone (the soil above the groundwater). As a precaution, SVE is included to capture and treat potential fugitive vapors. SVE will be installed to prevent impact to site occupants.	9	2.2
4. Biosparging, SVE, Nutrients/ Microorganism Enhancement, Monitoring, and IC	This alternative is identical to Alternative 3, with the addition of essential nutrients and or microbial substrates to increase the biodegradation rate and decrease remediation time by an estimated 1 year.	8	2.3
5. Air Sparging, SVE, Monitoring, and IC	Similar to Alternative 3. This alternative involves the injection of air at higher pressure, which increases the risk of fugitive vapors. SVE will be present as a safeguard.	8	2.2
6. Pump and Treat, Monitoring, and IC	This alternative involves extracting and treating groundwater contaminated with benzene and naphthalene. Throughout and after the treatment period, a possibility exists that recontamination could happen through re-infiltration of groundwater through a "smear zone" of contaminated soil at the soil-water interface.	15	3.2



**Figure 3. Alternatives 3, 4, and 5 Conceptual Biosparge and Air Sparging Conceptual Design**

## COMPARISON OF ALTERNATIVES

Selection of the preferred alternative is based on the nine National Oil and Hazardous Substances Contingency Plan (NCP) criteria,

as presented in Table 4, which is followed by specific evaluation of the individual groundwater alternatives for OU-5/IR-02.

**Table 4. NCP Evaluation Criteria**

1. **Overall protection of human health and the environment** addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled.
2. **Compliance with ARARs** addresses whether or not a remedy will meet all applicable or relevant and appropriate Federal and State environmental laws and regulations or provide grounds for a waiver.
3. **Long-term effectiveness and permanence** refers to the ability of a remedy to provide reliable protection of human health and the environment over time.
4. **Reduction of toxicity, mobility, or volume through treatment** refers to preference for a remedy that reduces health hazards, the movement of contaminants, or the quantity of contaminants at the site through treatment.
5. **Short-term effectiveness** addresses the period of time needed to complete the remedy and any adverse effects to human health and the environment that may be caused during construction and implementation of the remedy.
6. **Implementability** refers to the technical and administrative feasibility of the remedy, including availability of materials and services needed to carry out the remedy and coordination of Federal, State, and local governments to work together to clean up the site.
7. **Cost** evaluates estimated capital and operation and maintenance costs of each alternative in comparison to other, equally protective measures.
8. **State acceptance** indicates whether the State agrees with, opposes, or has no comment on the alternative.
9. **Community acceptance** includes determining which components of the alternatives interested persons in the community support, have reservations about, or oppose (not complete until public comments on Proposed Plan are received).

NCP evaluation criteria are divided into three categories:

- **Threshold.** These criteria (1 and 2) must be satisfied for an alternative to be eligible.
- **Primary Balancing.** These criteria (3, 4, 5, 6, and 7) are used to weigh major trade-offs among alternatives.
- **Modifying.** Once all comments are evaluated, State and community acceptance (8 and 9) may prompt modifications of the final remedy and are thus designated modifying criteria.

The following is a comparison of the six remedial alternatives to the nine NCP criteria. Table 5 summarizes this discussion.

1. **Overall Protection of Human Health and the Environment.** All of the alternatives, except Alternative 1, are protective of human health and the environment by reducing the risks posed by the site through ICs. Alternative 1, which failed this first criterion, will not be further compared. The No Action Alternative provides a basis of comparison and is required by the NCP.
2. **Compliance with ARARs.** Alternatives 2 through 6 meet the ARARs.

3. **Long Term Effectiveness and Permanence.** Alternative 2 would have low long-term effectiveness, Alternatives 3 and 6 would be moderately effective and permanent, and Alternatives 4 and 5 would have high long-term effectiveness.
4. **Reduction of Toxicity, Mobility, or Volume through Treatment.** Alternative 2 does not include treatment as a component of the remedy. Alternatives 3 and 6 reduce the toxicity, mobility, or volume of contamination at the site. Alternatives 4 and 5 are rated the best at achieving this criterion.

5. **Short-Term Effectiveness.** Alternatives 2 through 4 and 6 have moderate to high short-term effectiveness. Alternative 4 has high short-term effectiveness because there is a lower potential for air emissions. Alternative 5 has low short-term effectiveness because it will increase the volatilization of groundwater contaminants into the vadose zone. Alternatives 3 through 5 have similar time periods to complete the remedy (8 to 9 years). Alternative 6 is estimated to require nearly twice the time needed for Alternatives 3 through 5 (15 years). Alternative 2 exceeds a reasonable time to complete the remedy (50 years).
6. **Implementability.** All of the alternatives are implementable. Materials and services are readily and commercially available. The varying degrees of implementability are shown in Table 5 and range from moderate to high. Alternative 4 has lower

implementability than Alternative 3 due to the addition of nutrient/microorganism enhancement.

7. **Cost.** The estimated total costs of Alternatives 2 through 5 are similar. Alternative 6 would cost approximately \$1 million more than Alternatives 2 through 5.
8. **State Agency Acceptance.** The State of California as a participant in the decision-making team has reviewed the Proposed Plan and supports the preferred alternative.
9. **Community Acceptance.** Community acceptance will be evaluated after the public comment period ends. A responsiveness summary in the ROD will document responses to public comments.

**Table 5. Comparative Analysis of OU-5 Groundwater Alternatives**

NCP Criteria	1	2	3	4	5	6
	No Action	MNA IC	BS SVE Monitor IC	BS SVE N/M Monitor IC	Air SVE Monitor IC	P&T Monitor IC
Protective Overall?	No	Yes	Yes	Yes	Yes	Yes
Compliant with ARARs?	No	Yes	Yes	Yes	Yes	Yes
Long-term Effectiveness and Permanence	None	○	◐	●	●	○
Reduction of Toxicity, Mobility, or Volume via Treatment	None	○	◐	●	●	○
Short-term Effectiveness	None	◐	◑	●	○	◐
Implementability	None	●	●	◐	●	◐
Cost (\$M)	0	2.2	2.2	2.3	2.2	3.2
State Acceptance	State Concurs with Proposed Remedy					
Community Acceptance	To be evaluated after the Public Comment Period					

- = low
- ◐ = mod low
- ◑ = mod
- ◒ = mod high
- = high

BS - Biosparging  
 IC - Institutional Controls  
 MNA - Monitored Natural Attenuation  
 N/M - Nutrient/Microorganism Enhancement  
 P&T - Pump and Treat  
 SVE - Soil Vapor Extraction

**Alternative 4 is the Preferred Alternative.**

## PREFERRED ALTERNATIVE

The Navy, in coordination with the regulatory agencies, has made a risk management decision to take remedial action to reduce the mass of contaminants in groundwater to facilitate biodegradation of benzene and naphthalene and to prevent potential future unacceptable exposures in the unlikely event that the groundwater may be used for drinking water in the future. The preferred alternative, Alternative 4, consists of biosparging with SVE, nutrient/microorganism enhancement, as required, monitoring, and ICs. Alternative 4 is estimated to achieve the RAOs within 8 years. During that time, ICs will be implemented to protect human health.

Under the proposed remedy, the biosparging will reduce the time needed for remediation by slowly injecting air into the saturated zone at a flow rate designed to maximize biodegradation in the saturated and unsaturated zones while minimizing the release of volatile chemicals to the atmosphere. Nutrients (in either liquid or gas form) and/or microorganism enhancement may also be administered to accelerate remediation. A vapor extraction and treatment system is included to mitigate potential human health risk from possible fugitive emissions during biosparging, although this risk is minimal.

Details of the remediation will be defined in the remedial design. Treatability studies may be conducted to assess the need for nutrients or microbial substrates. Monitoring and control, as well as operation and maintenance efforts, will be implemented to ensure the system runs smoothly.

The performance criteria for biosparging will be monitored by:

- Continued decline of contaminant concentrations in samples collected from site monitoring wells
- Receding contaminant plumes
- Documented degradation of residual contaminant concentrations to below RAOs

The ARARs for Alternative 4 are discussed in Table 6, located before the glossary section.

## SUMMARY STATEMENT

Based on information currently available, the preferred alternative for groundwater meets the NCP threshold criteria and satisfies the following statutory requirements of CERCLA 121(b):

1. Protective of human health and the environment
2. Compliant with ARARS
3. Cost-effective
4. Utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable
5. Satisfies the preference for treatment

### Multi-Agency Environmental Team Concurs with Preferred Remedy

The environmental team, which has been working cooperatively to address remedial decisions for Alameda Point OU-5/IR-02 groundwater and will sign the ROD, consists of:

- The Navy
- EPA Region 9
- DTSC
- RWQCB

## OPPORTUNITIES FOR PUBLIC INVOLVEMENT

### Information Repositories

Individuals interested in the full technical details beyond the scope of this Proposed Plan should visit either of the two local Information Repositories in Alameda:

- Alameda Point - 950 West Mall Square, Bldg 1, Rooms 240 and 241
- Alameda Public Library - 2200A Central Avenue

Supporting documents describing the field investigation, laboratory analysis, and risk assessment are part of the Alameda Point Administrative Record (AR) and are available for your review at the Information Repositories in Alameda. These reports include:

- 2002 - OU 5 Remedial Investigation Report
- 2004 - Groundwater Remedial Investigation/ Feasibility Study, Alameda Point Site 25/Alameda Annex IR-02

## Site Contacts

Community involvement in the decision-making process is encouraged. If you have any questions or concerns about environmental activities at Alameda Point, please feel free to contact any of the following project representatives:

- **Mr. Thomas Macchiarella**  
BRAC Environmental Coordinator  
Department of the Navy  
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1455 Frazee Road, Suite 900  
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- **Ms. Anna-Marie Cook**  
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- **Mr. Henry Wong**  
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- **Ms. Judy Huang**  
Project Manager  
San Francisco Bay RWQCB  
1515 Clay Street, Suite 1400  
Oakland, CA 94612  
(510) 622-2363

## Administrative Record

The AR is the collection of reports and historical documents used by the decisionmaking team in the selection of cleanup or environmental management alternatives. The AR file provides a ROD and actions by the Navy for the site discussed in this Proposed Plan. The AR file is located at:

- **Naval Facilities Engineering Command, Southwest**  
1220 Pacific Highway  
San Diego, CA 92132-5190  
ATTN: Diane Silva FISC Building 1, 3<sup>rd</sup>  
Floor  
Phone: (619) 532-3676

## PUBLIC COMMENT PERIOD

The 30-day public comment period for the Proposed Plan is March 6 through April 4, 2006.

### Submit Comments

There are two ways to provide comments during this period:

- Offer oral comments during the public meeting
- Provide written comments by mail, email or fax (no later than April 4, 2006)



### Public Meeting

The public meeting will be held on Wednesday, March 15, 2006 at Alameda Point, 950 West Mall Square, Room 201 from 6:30 pm to 8:00 pm. It will be an opportunity to discuss the information presented in this Proposed Plan. Navy

representatives will provide visual displays and information on the environmental investigations and the cleanup alternatives evaluated. You will have an opportunity to ask questions and formally comment on this Proposed Plan.



### Send Comments to:

Mr. Thomas Macchiarella  
BRAC Environmental Coordinator  
Department of the Navy  
BRAC Program Management Office West  
1455 Frazee Road, Suite 900  
San Diego, CA 92108-4310  
Phone (619) 532-0907  
Fax (619) 532-0940  
Website address is: [www.navybracpmo.org](http://www.navybracpmo.org)  
[Thomas.macchiarella@navy.mil](mailto:Thomas.macchiarella@navy.mil)



**Table 6. Applicable or Relevant and Appropriate Requirements**

CERCLA requires that remedial actions meet federal or state (if more stringent) environmental standards, requirements, criteria, or limitations that are determined to be ARARs. Significant potential ARARs that will be met by the preferred remedy for cleanup of groundwater are listed below. See the RI/FS report for more specific information on potential ARARs.

**Potential Federal ARARs**

- Substantive requirements of Section 52.220 [Clean Air Act (42 USC Section 7401-7671)] for restricting emissions during operation of the SVE treatment system in connection with groundwater biosparging treatment

Substantive requirements of the following provisions of Cal. Code Regs. tit. 22 have been determined to be federal action- or chemical-specific ARARs:

- Determination of RCRA characteristic hazardous waste [Sections 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100(a)(1)]
- Onsite waste generation [Sections 66262.10(a), 66262.11, and 66264.13(a) and (b)]
- Hazardous waste accumulation [Section 66262.34]
- RCRA groundwater protection standards [substantive provisions of Section 66264.94, except 66264.94 (a)(2) and 66264.94(b)]
- The substantive requirements of hazardous waste container storage regulations [Section 66262.171, .172, .173, .174, 175(a) and (b), .177, .178]
- The substantive requirements of corrective action monitoring (Sections 66264.100[d] and [g][1])

The Navy has determined that substantive requirements of Section 141.61(a) of 40 CFR pertaining to MCLs for organic compounds are not federal chemical-specific ARARs. The Navy does not consider the MCLs to be relevant or appropriate because the groundwater is unlikely to be used as a drinking water supply. The Navy's groundwater beneficial use determination report dated July 2000 states, "*For the purpose of CERCLA clean up decisions, groundwater in the western and central regions (including Site 25) of Alameda Point is unlikely to be used as a potential drinking water source.*" In June 1999, the RWQCB issued a letter that states the shallow groundwater at the Annex meets the exemption criteria in the SWRCB Resolution No. 88-63 and RWQCB Resolution No. 89-39, and it is unlikely that the shallow groundwater would be used as a source of drinking water. Portions of the groundwater within the plume underlying these sites are designated a potential drinking water source in the San Francisco Bay Basin Water Quality Control Plan (Basin Plan), but it is unlikely that the groundwater will be used as a drinking water source. The regulatory agencies consider MCLs (in this case, the MCL for benzene; naphthalene has no MCL) to be an ARAR for this specific site. Despite this difference as to the ARAR, the Navy and the regulatory agencies are in agreement as to the appropriate cleanup goal for benzene, which is set at a risk-based level equivalent to the MCL.

**The State of California Potential ARARs**

The substantive requirements of the following have been determined to be state chemical-specific ARARs:

- Non-RCRA hazardous waste determinations [Cal. Code Regs. tit. 22 Sections 66261.22(a)(3) and (4), 66261.24(a)(2) to (a)(8), 66261.101(a)(1) and (a)(2) and 66261.3(a)(2)(C) or 66261.3(a)(2)(F)]
- The San Francisco Bay Basin Water Quality Control Plan, for beneficial use, promulgated pursuant to the Porter-Cologne Water Quality Control Act (California Water Code Sections 13240, 13241, 13242, 13243)

Substantive requirements of the following requirements of the California Civil Code and the California Health and Safety Code (HSC) have been determined to be state action-specific ARARs implementation of institutional controls for property that will be transferred to a nonfederal entity:

- Cal. Code Regs. tit. 22 Section 67391.1, Land Use Covenants
- HSC Sections 25202.5; 25222.1; 25355.5(a)(1)(C), 25232(b)(1)(A)-(E), 252233(c), and 25234

Additionally, the following substantive provisions of Bay Area Air Quality Management District rules pertaining to emission controls for the operation of an SVE system in connection with groundwater treatment biosparging include:

- Rule 8-47-301, and 302 that restricts emissions of specific compounds or any other total organic compounds
- Rule 8-47-500 sets protocols for monitoring and record keeping
- Rule 8-47-600 details the procedures for sampling, analysis, and emission determinations

The San Francisco RWQCB identified the substantive provisions of the "Statement of Policy with Respect to Maintaining High Quality of Waters in California" SWRCB Res. 68-16) and "Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under California Water Code Section 13304" (SWRCB Res. 92-49) as State ARARs for OU-5/IR-02 groundwater remedial action. The SWRCB interprets Res. 68-16 as prohibiting further migration of the volatile organic contaminant plume at OU-5/IR-02; however, EPA and the Navy do not agree that SWRCB Res. 68-16 applies to further migration. Further, the Navy's position is that the SWRCB Res. 68-16 and 92-49 do not constitute chemical-specific ARARs (numerical values or methodologies that result in the establishment of a cleanup level at the site) since they are State requirements and are not more stringent than federal provisions of Cal. Code Regs. tit. 22 Section 66424.94, determined to be ARARs for OU-5/IR-02 groundwater remedial action. The San Francisco Bay RWQCB and DTSC do not agree with the Navy's determination that SWRCB Res. 92-49 and 68-16 are not ARARs for OU-5/IR-02 remedial action; however, the RWQCB and DTSC agree that the proposed remedial action would comply with SWRCB Res. 92-49 and 68-16.

## GLOSSARY OF TECHNICAL TERMS

**Administrative Record (AR)** - The reports and historical documents used in selection of clean-up or environmental management alternatives.

**Applicable or Relevant and Appropriate Requirements (ARARs)** - Federal or State (if more stringent) environmental standards, requirements, criteria, or limitations.

**BRAC Cleanup Team (BCT)** - Base realignment and closure cleanup team consisting of representatives from the Navy, EPA, DTSC, and RWQCB.

**Base Realignment and Closure (BRAC) Program** - Program established by Congress under which Department of Defense installations undergo closure, environmental cleanup, and property transfer to other federal agencies or communities for reuse.

**Below Ground Surface (bgs)** - Collection depth of a sample or depth of an excavation.

**Biodegradation** - Destruction of contaminants by microorganisms in groundwater.

**Biosparging** - This technology introduces air into groundwater as an oxygen source at a low, controlled flow rate for aerobic degradation, thereby accelerating naturally occurring aerobic biodegradation processes.

**California Environmental Protection Agency Department of Toxic Substances (DTSC)** - California's environmental protection agency. Also known as Cal/EPA, but herein referred to as DTSC.

**Clean-up goals** - A quantitative means of identifying areas for potential remedial action, for screening the types of appropriate technologies, and for assessing a remedial action's ability to achieve the RAOs.

**Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)** - Also known as Superfund, this federal law regulates environmental investigation and cleanup of sites identified as possibly posing a risk to human health or the environment.

**Contaminant** - A chemical present in the groundwater at concentrations that may pose a threat to human health.

**Ecological Risk Assessment (ERA)** - Evaluation of potential hazard to plants, animals, and habitat as a result of environmental exposure to chemicals.

**Exposure Pathway** - Mechanism by which a chemical comes into contact with a living organism.

**Exposure Point Concentration (EPC)** - Statistically determined concentration of a chemical in soil or groundwater that is estimated to represent that chemical throughout the area being studied.

**Feasibility Study (FS)** - Analysis of proposed remedial alternatives to evaluate their effectiveness in reduction of risk to human health and the environment.

**Fleet and Industrial Supply Center Oakland, Alameda Facility/Alameda Annex (FISCA)** - Former Navy supply facility.

**Hazard Quotient (HQ)** - Ratio of exposure to toxicity of an individual chemical.

**Human Health Risk Assessment (HHRA)** - Estimate of potential harmful effects humans may experience as a result of exposure to chemicals.

**Institutional Controls (ICs)** - Administrative and legal controls, established and administered to restrict use of property to limit human exposure to contaminated waste, soil, sediment, or groundwater and protect the integrity of the remedy.

**Installation Restoration (IR) Program** - Department of Defense's comprehensive program to investigate and clean up environmental contamination at military facilities in full compliance with CERCLA.

**Microorganisms** - Microscopic organisms that live in the groundwater.

**Monitored Natural Attenuation (MNA)** - Careful tracking of natural in-situ processes that degrade groundwater contamination.

**Polynuclear Aromatic Hydrocarbon (PAH)** - Specific class or group of semivolatile organic compounds whose molecules consist of multiple benzene rings. "Polynuclear" means multi-ringed. Some are suspected as cancer-causing compounds and are commonly associated with fuels and waste oil.

**Reasonable Maximum Exposure (RME)** - Potential duration and frequency estimated by dividing daily intake by time of exposure.

**Record of Decision (ROD)** - A legal document that explains the selected cleanup method to be used. It is signed by the Navy and regulatory agencies and is a binding agreement regarding how and when a site remediation is conducted.

**Regional Water Quality Control Board (RWQCB)** - The California water quality authority.

**Remedial Action Objective (RAO)** - Cleanup objective.

**Remedial Investigation (RI)** - One of the two major studies that must be completed before a decision can be made about how to clean up a site (the FS is the second study). The RI is designed to determine the nature and extent of contamination at the site.

**Risk** - Likelihood or probability that a hazardous substance released to the environment will cause adverse effects on exposed human or other biological receptors. Classified as carcinogenic (cancer causing) or non-carcinogenic.

**Risk Management** - Evaluation and implementation of options or measures to reduce risk, including but not limited to, such options as no further action, monitoring only, or gathering additional data before making a decision.

**Soil Vapor Extraction (SVE)** - Process by which contaminant vapors in the soil are extracted and treated.

# Proposed Plan Comment Form

## Alameda Operable Unit 5/IR-02 Groundwater

The public comment period for the Proposed Plan for Operable Unit 5/IR-02 Groundwater, Former Naval Air Station (NAS) Alameda at Alameda Point and Alameda Annex, Alameda, California is from March 6, 2006 through April 4, 2006. A public meeting to present the Proposed Plan will be held at the Alameda Point Main Office Building, Room 201, 950 West Mall Square, Bldg. 1, Alameda, California on March 15, 2006 from 6:30 to 8:00 pm. You may provide your comments verbally at the public meeting where your comments will be recorded by a court reporter. Alternatively, you may provide written comments in the space provided below or on your own stationary. All written comments must be postmarked no later than April 4, 2006. You may also submit this form to a Navy representative at the public meeting. Comments are also being accepted by e-mail; please address e-mail comments to [thomas.macchiarella@navy.mil](mailto:thomas.macchiarella@navy.mil).

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

Representing: \_\_\_\_\_

Phone Number: \_\_\_\_\_

Address: \_\_\_\_\_

Comments:

Mail to:

Thomas Macchiarella  
BRAC Environmental Coordinator  
BRAC Program Management Office West  
1455 Frazee Road, Suite 900  
San Diego, CA 92108-4310

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**Proposed Plan for Operable Unit 5/  
IR-02 Groundwater, Former NAS  
Alameda and Alameda Annex (FISCA)**

**BRAC**  
**PMO WEST**



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March 3, 2006  
Doc No.

Ms. Mary E. Parker  
Department of the Navy  
Base Realignment and Closure  
Program Management Office West  
1455 Frazee Road, Suite 900  
San Diego, CA 92108

Subject: Navy Contract No. N68711-00-D-0004, Delivery Order 0038  
Multi-Media Environmental Compliance  
Operable Unit 5, Alameda Point, Alameda, CA  
Submittal of Final Proposed Plan for OU-5 Groundwater

Dear Ms. Parker:

In accordance with your request, enclosed are five copies and one CD of the Final Proposed Plan for OU-5/IR-02 Groundwater Former NAS Alameda and Alameda Annex (FISCA), Alameda, California.

With the Navy's cover letter, we have distributed copies per the distribution list. We have sent three copies to Ms. Diane Silva for the administrative record. We have placed two copies in each of the two Alameda public information repositories. Per the public distribution mailing list, individual copies were mailed to 1,410 addresses.

If you have any questions or require additional information, please call Mike Allen or me at (858) 268-3383.

Sincerely,

Larry Davidson, P.E.  
Program Manager  
CDM Federal Programs Corporation

c: J. Howell-Payne, NAVFAC Southwest (w/o)  
D. Silva, NAVFAC Southwest (w/3)  
C. Zakowski  
M. Allen  
File