



PROPOSED PLAN FOR GROUNDWATER CLEANUP, FORMER NAVAL AIR STATION MOFFETT FIELD

Installation Restoration Site 26

Moffett Field, California

April 2013



NAVY ANNOUNCES PROPOSED PLAN TO AMEND GROUNDWATER CLEANUP REMEDY

The Navy is seeking comments from the public on its proposed action to modify the groundwater cleanup remedy in place at *Installation Restoration (IR)*¹ Site 26 at the former Naval Air Station (NAS) Moffett Field (Moffett Field) in Moffett Field, California (Figure 1). In addition, the Navy invites the public to a Proposed Plan Public Meeting on May 16, 2013, where the *Proposed Plan* will be presented and verbal comments recorded.

This Proposed Plan presents alternatives being considered to optimize groundwater cleanup at the Site (Figure 2). The current remedy in place at Site 26 is “*pump-and-treat*”, which consists of groundwater extraction, aboveground treatment, on-site discharge, groundwater monitoring, and institutional controls. This remedy was selected under the *Moffett Federal Airfield, Final Operable Unit 5 Record of Decision (ROD)* in 1996, and the pump-and-treat system was operated at the Site from 1999 to 2003. The system was shut down in 2003 to evaluate its efficiency, the stability of the plume, conditions for natural attenuation and to determine if the pump-and-treat remedy would meet the timeframe to achieve the groundwater *remediation goals* identified in the ROD.

Since 2003, the Moffett Field *Base Realignment and Closure (BRAC)* Cleanup Team (BCT) has evaluated data on the performance and effectiveness of the pump-and-treat remedy, monitoring data, alternative remedial technologies, and treatability study data. The BCT consists of representatives from the Navy, the U.S. Environmental Protection Agency, Region 9 (EPA), and the San Francisco Bay Regional Water Quality Control Board (Water Board). The alternative remedial approaches include new technologies and processes that could be used to optimize or enhance groundwater cleanup in a shorter timeframe. The evaluation of the alternative remedial technologies, along with evaluation of the current remedy, and the related treatability studies are presented in a Focused *Feasibility Study*

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–NOTICE –

PROPOSED PLAN COMMENT PERIOD AND PUBLIC MEETING

Public Comment Period

April 15 to May 29, 2013

Proposed Plan Public Meeting

May 16, 2013

Mountain View Senior Center

266 Escuela Avenue

Mountain View, CA

7:00 to 9:00 PM

¹ Words in *bold italic* type are defined in the Glossary of Terms on pages 10-11.

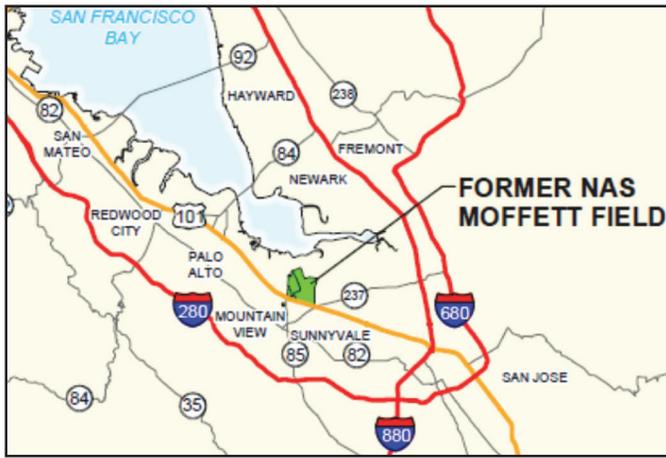


Figure 1. Location of Moffett Field

(Focused FS) for Site 26, finalized in July 2012. Based on the results of the Focused FS, the Navy proposes implementation of Alternative 5, ***Bio stimulation/ Bioaugmentation, Monitored Natural Attenuation (MNA), and Institutional Controls (ICs)***. This remedy would be implemented to perform targeted treatment in the portions of the groundwater plume with the highest remaining concentrations of chlorinated ***volatile organic compounds (VOCs)***, as well as monitor the treatment progress and prevent exposure to VOCs in groundwater until remediation goals are met.

The Navy proposes to replace the existing pump-and-treat remedy with bio stimulation/bioaugmentation, MNA, and ICs, which will consist of:

- ✓ Actively treating the groundwater by injecting dechlorinating bacteria and nutrients into groundwater (bio stimulation/bioaugmentation) in two areas of the plume to enhance and accelerate biodegradation of the VOCs;
- ✓ Monitoring groundwater in new and existing wells to verify VOC decay rates and estimated cleanup times throughout the plume;
- ✓ Reinjecting the bio stimulation/bioaugmentation nutrient mixture into groundwater within two to three years after the initial injection, if needed, based on an evaluation of post-injection monitoring and treatment effectiveness data;
- ✓ Implementing ICs to prevent human exposure to contaminated groundwater or potential vapors; and
- ✓ Conducting five-year reviews to evaluate the effectiveness and protectiveness of the remedy.

This Proposed Plan has been prepared to inform the public of the current conditions and the site history, environmental investigations, remediation progress to date, the remedial (cleanup) alternatives evaluated to optimize the groundwater remedy for Site 26, and the basis for proposing the preferred remedial alternative.

The Navy encourages the public to review and comment on this Proposed Plan during the 45-day public comment period. A public meeting will be held during this time. The details on the public comment period and public meeting are provided in the notice on Page 1. The Navy will take into consideration public comments on this Proposed Plan before making a final cleanup decision that will be documented in either an ***Explanation of Significant Differences (ESD)***, or an amendment to the ROD (***ROD Amendment***). Responses to comments on this Proposed Plan will be included in the ***Responsiveness Summary*** attached to the cleanup decision document, the availability of which will be announced to the public following its completion.

THE CERCLA PROCESS

The Navy is issuing this Proposed Plan as part of its public participation responsibilities under Section 117(a) of the ***Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)***, also known as Superfund, and Section 300.430(f)(2) of the ***National Oil and Hazardous Substances Pollution Contingency Plan (NCP)***, Federal Register, Volume 55, No. 46. Figure 3 illustrates the CERCLA process and the status of Site 26. After the EPA adds a site to the ***National Priorities List (NPL)***, a ***remedial investigation/feasibility study (RI/FS)*** may be performed at the site. Data collection occurs during the RI, while the FS is used to look at different ways to

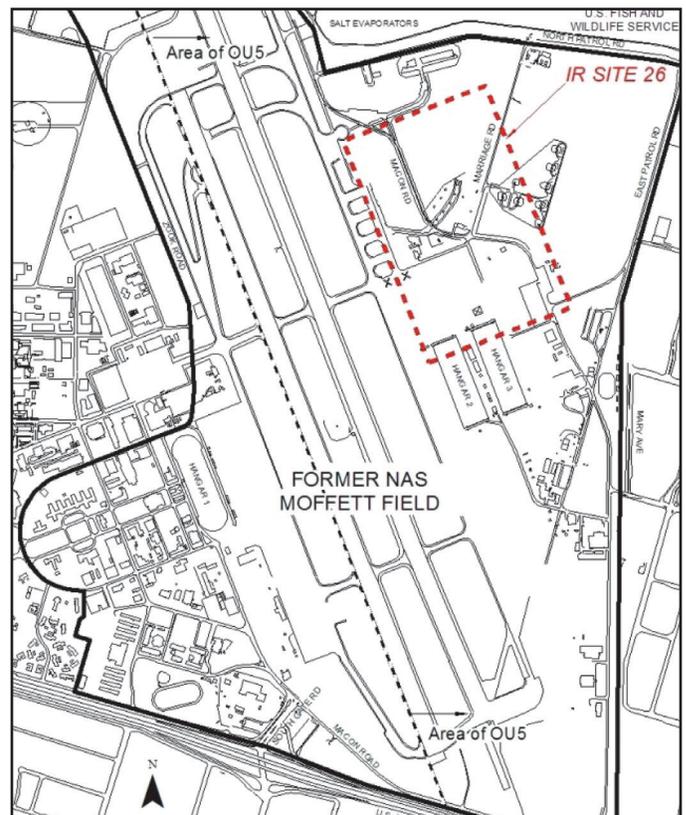


Figure 2. Site Location Map

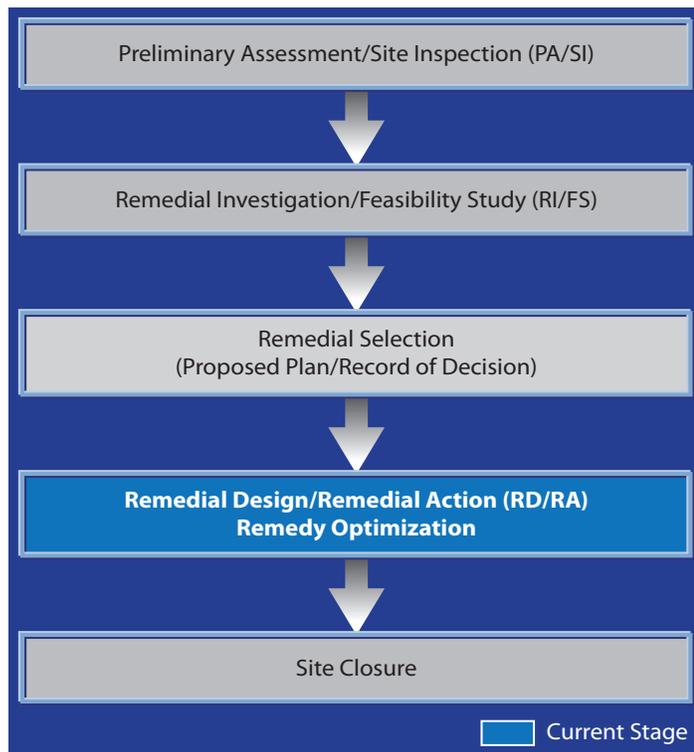


Figure 3. Site 26 CERCLA Process

clean up the site. The ROD documents the decisions made regarding the cleanup at the site. The remedial implementation is reviewed every five years to evaluate the effectiveness of the remedy to meet the remedial objectives and goals. If monitoring data show that the remedial objectives cannot be achieved as specified in the ROD, additional site characterization and evaluation of alternative remedial technologies may be performed and documented in the *Administrative Record*, typically in a Focused FS. If an alternate approach is identified that will meet the remedial objectives better than the technology specified in the original ROD, then a new Proposed Plan can be issued for public review and comment. Any decisions made regarding changes in the site cleanup approach are documented in an ESD, or ROD Amendment, as appropriate.

The purposes of this Proposed Plan are to do the following:

- ✓ Provide a description of remedial progress made and studies performed since the selected remedy documented in the ROD was implemented;
- ✓ Describe the other cleanup options evaluated;
- ✓ Request public review of and comment on the alternatives considered; and
- ✓ Provide information on how the public can be involved in the optimized remedy selection process for groundwater at Site 26.

The public is encouraged to comment on the preferred remedial (cleanup) alternative presented in this Proposed

Plan. The *preferred alternative* was selected based on five treatability studies and the Focused FS that are included in the Moffett Field Administrative Record. These studies and reports are available to the public for review at the Information Repository location listed on page 9 of this Proposed Plan.

SITE BACKGROUND

Moffett Field is located 35 miles south of San Francisco at the northern end of the Santa Clara Valley Basin, approximately one mile south of San Francisco Bay (Figure 1). The Navy operated the facility as a Naval Air Station from 1933 to 1935 and 1942 to 1994. In 1994, Naval Air Station Moffett Field was closed as an active military base and the property was transferred to the National Aeronautics and Space Administration (NASA) with the exception of the military housing, which was transferred to the U.S. Air Force and then to the Army in 2000. The Navy began environmental assessments and investigations at Moffett Field in 1984. These activities identified various sites that posed potential risks to human health and the environment. Moffett Field was placed on the NPL in 1987. Placement on the NPL initiated the RI/FS process. The RI for the investigation area referred to as Operable Unit 5 (OU 5), which consisted of aquifers on the eastern side of Moffett Field (now inclusive of Site 26), was completed in 1993 and the FS was completed in 1995. Based on the evaluation and comparison of remedial alternatives in the FS, the Navy selected groundwater extraction and aboveground treatment of the water using air stripping (pump-and-treat), on-site permitted discharge of treated water to the storm sewer, and ICs.

The selected remedy was documented in the ROD in 1996, and implemented at the Site in 1999. A liquid-phase granular activated carbon adsorber was added to the aboveground water treatment system in series with the air stripper. The pump-and-treat system, called the East-Side Aquifer Treatment System, was operated at the Site from 1999 to 2003, and groundwater monitoring has been ongoing. The treatment system was taken off-line in 2003 to evaluate its efficiency, the stability of the plume, and the conditions for natural attenuation. Results of the study indicated the VOCs were slowly attenuating naturally, and the groundwater plume was generally stable. Since that time, groundwater monitoring, data evaluations, and additional studies have been conducted at the Site.

SITE DESCRIPTION

Site 26 is located in the northeast portion of Moffett Field within OU 5 (Figure 2). Site 26 is bordered by the airfield runways to the west, Hangars 2 and 3 to the south, East Patrol Road to the east and a wildlife refuge

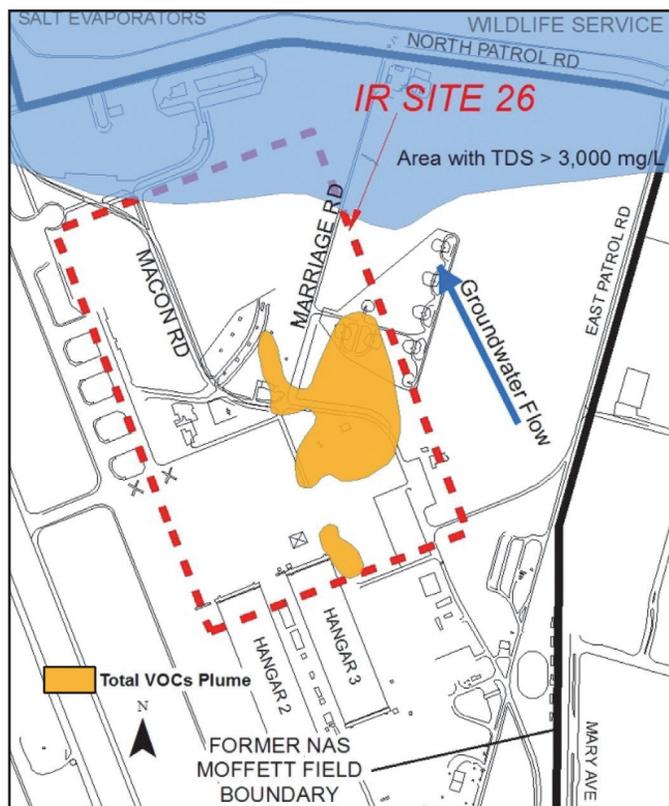


Figure 4. Total VOCs Distribution Exceeding Remediation Goals in the Site 26 Southern Plume

to the north. Hangars 2 and 3 fall within the Shenandoah Plaza Historic District and are contributing structures to the historical significance of the district. In addition, a weapons bunker and golf course driving range are located northeast of Site 26. An area near the center of Site 26, just south of Macon Road, has been identified as habitat for the burrowing owl. A habitat plan designed to preserve the owl habitat is currently being implemented by NASA.

Historical evaluations, environmental investigations, and treatability studies have been conducted at Site 26 since 1984. Initial investigations conducted at the Site identified the presence of low levels of VOCs in groundwater that were likely present due to solvents reportedly used at Hangars 2 and 3, which were discharged on site with wastewater. Two separate groundwater plumes were identified in the vicinity of Site 26; a northern plume and a southern plume. The northern plume was present in an area where total dissolved solids (TDS) in groundwater are at concentrations above 3,000 milligrams per liter, which disqualifies it as a potential drinking water source by State Water Resources Control Board (SWRCB) Resolution 88-63 standards. Therefore, the selected remedy identified in the ROD for the northern plume is groundwater monitoring. The southern plume (Figure 4) qualifies as a potential drinking water source and

contains VOCs in groundwater at concentrations above ROD cleanup standards. Therefore, from 1999 to 2003, the pump-and-treat system was installed and operated in the southern plume, and ICs were put in place to restrict the use of groundwater in accordance with the ROD.

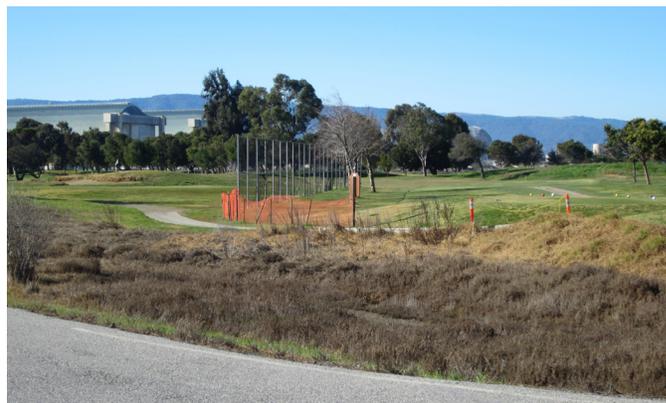
Presently, access and development in the area of Site 26 is restricted due to runway and air operations. There are no drinking water wells within the site boundary, and the nearest residential area is approximately one mile southwest. No current development plans are in place to change the primary uses of Moffett Field or the Site 26 area.

WHAT ARE THE RISKS?

A *human health risk assessment (HHRA)* and *ecological risk assessment (ERA)* were conducted and the results were presented in the OU 5 RI/FS, and are summarized below.

The HHRA considered both residential and occupational exposure from VOCs in soil vapor and groundwater from the upper portion of the A-aquifer. Even though shallow groundwater is not used as a drinking water source and airfield activities at Moffett Field prevent this area from residential development, exposure to future residents was assessed. The two major findings of the HHRA were that: 1) pathways associated with groundwater exposure to residents under the current land-use scenario are incomplete, and 2) occupational exposure to groundwater does not present significant risks to site workers.

The ERA identified two potential complete surface water exposure pathways at Site 26 within two ditches that can receive groundwater discharge from pump-and-treat activities, which potential ecological receptors could come in contact with. The assessment involved the comparison of the maximum concentrations of *chemicals of concern (COCs)* detected in groundwater from 1989 to 1996 to ecological benchmarks. Through this comparison, it was determined that even if the



Southwest view across the golf course looking to the Site 26 Southern Plume

highest concentration of COCs reached ecological receptors in surface water present in ditches, there would be no adverse effects that would change the decision-making process for remediation.

REMEDIAL ACTION OBJECTIVES AND REMEDIATION GOALS

The following *remedial action objectives (RAOs)* were identified in the ROD to ensure that human health and the environment are protected at the Site:

- Protect human health by preventing unacceptable exposure to contaminated groundwater at Site 26;
- Maintain present and future beneficial groundwater uses by achieving cleanup standards; and
- Protect environmental receptors from potential unacceptable exposure to contaminated groundwater from Site 26.

The potential beneficial use of groundwater at Site 26 as a municipal and domestic water supply prompted the selection of *maximum contaminant levels (MCLs)* as the cleanup standards or remediation goals for VOCs present within the plume at the Site. The ROD identified six COCs in Site groundwater: *1,2-dichloroethane (DCA)*, *1,1-dichloroethene (DCE)*, *1,2-DCE*, *tetrachloroethene or perchloroethylene (PCE)*, *trichloroethene (TCE)*, and *vinyl chloride (VC)*. Table 1 lists the COCs in groundwater, their maximum concentrations detected in 2010 as presented in the Focused FS, and the cleanup standards (MCLs) that are the remediation goals for Site groundwater presented in the ROD.

TREATABILITY STUDIES

A series of treatability studies were conducted at the Site after the pump-and-treat system was taken off-line in 2003 to evaluate the feasibility of using in-place (*in situ*) treatment of groundwater without requiring aboveground pumping. A natural attenuation study was performed from 2003 through 2005 which found that attenuation of COCs is taking place at the Site but at a slow rate. In 2005, a hydrogen release compound (HRC) study was conducted to determine the effectiveness and applicability of HRC to promote *reductive dechlorination* of VOCs. The study concluded that reductive dechlorination was occurring, but that the process was not proceeding to completion because the microbial populations within the aquifer were too low to sustain biodegradation of the COCs. An *abiotic/biotic* treatment technology study was performed in 2009 that involved injecting a substrate made up of zero-valent iron and solid organic carbon into the subsurface. The abiotic/biotic method was shown to be a potentially applicable treatment alternative at Site 26 as VOC

concentrations were reduced to below remediation goals in several treatment areas and complete dechlorination of VOCs was observed at locations where sufficient substrate and highly reducing conditions persisted. In addition, the Focused FS included evaluation of the effectiveness of an in situ biostimulation/bioaugmentation pilot test conducted at a nearby Moffett Field Site (Site 28) in 2010. This pilot test used both emulsified vegetable oil (EVO) and sodium lactate, augmented with a dechlorinating bacteria culture to remediate VOCs in groundwater. Table 1 includes the maximum concentration for each COC in 2010 after the treatability studies were complete.

Table 1 – Chemicals of Concern, Maximum Concentrations, and Remediation Goals

Chemical of Concern	Maximum Concentration (micrograms/liter)	Remediation Goals (MCLs) (micrograms/liter)
1,2-DCA	1	0.5
1,1-DCE	2.3	6
1,2-DCE	21	6
PCE	52	5
TCE	24	5
VC	12	0.5

SUMMARY OF REMEDIAL ALTERNATIVES EVALUATED IN THE FOCUSED FEASIBILITY STUDY

Multiple remedial technologies and options were evaluated in the Focused FS to remediate VOCs in groundwater at Site 26. The best options, along with an optimized version of the existing pump-and-treat remedy, were refined into the five remedial alternatives as summarized in Table 2.

HOW DO THE ALTERNATIVES COMPARE?

The alternatives were compared using the nine NCP evaluation criteria shown on Figure 5. These criteria are categorized into three groups: (1) threshold criteria, (2) balancing criteria, and (3) modifying criteria. The threshold criteria include: (1) overall protection of human health and the environment, and (2) compliance with *applicable or relevant and appropriate requirements (ARARs)*. These threshold criteria must

Table 2 – Description of Remedial Alternatives

ALTERNATIVE	COST	ESTIMATED TIME	COMPONENTS OF ALTERNATIVE
1: No Action	\$0	0	No Action: No actions or costs; this alternative is required by CERCLA as a baseline for comparison with other alternatives.
2: MNA and ICs	\$1.4 million	100 years (100 years of monitoring)	<p>MNA: Implement long-term monitoring of groundwater to evaluate the degradation of VOCs and the reduction of the VOC plume, and to monitor MNA parameters for changes in ambient conditions.</p> <p>ICs: Implement ICs that would restrict groundwater use and prohibit activities that could result in human exposure to VOCs in groundwater.</p>
3: Optimized Pump and Treat and ICs	\$5.7 million	43 years (40 years of treatment; followed by 3 years of monitoring)	<p>Optimized Treatment: Optimize the pump-and-treat system (install new extraction wells) for COC mass removal from groundwater. Monitor groundwater to evaluate the performance of the pump-and-treat system, progress towards cleanup goals, and evaluate plume capture.</p> <p>ICs: Implement ICs that would restrict groundwater use and prohibit activities that could result in human exposure to VOCs in groundwater.</p>
4: Biotic/ Abiotic Treatment, MNA, and ICs	\$3.7 million	38 years (up to three years of treatment; followed by up to 35 years of monitoring)	<p>In Situ Treatment: Inject an organic compound and zero-valent iron to stimulate reductive dechlorination of COCs using both biotic and abiotic chemical reactions. The additives will be reinjected in two to three years, if needed, based on results of post-injection monitoring.</p> <p>MNA: Implement long-term monitoring of groundwater to monitor the degradation of VOCs and the reduction of the VOC plume and to monitor MNA parameters and evaluate the effects of the treatment.</p> <p>ICs: Implement ICs that would restrict groundwater use and prohibit activities that could result in human exposure to VOCs in groundwater.</p>
5: Biostimulation/ Bioaugmentation Treatment, MNA, and ICs	\$2.2 million	38 years (up to three years of treatment; followed by up to 35 years of monitoring)	<p>In Situ Treatment: Inject emulsified vegetable oil, or a similar substrate and a dechlorinating bacterial culture to stimulate reductive dechlorination of COCs through chemical reactions. The additives will be reinjected in two to three years, if needed, based on results of post-injection monitoring.</p> <p>MNA: Implement long-term monitoring of groundwater to monitor the degradation of VOCs and the reduction of the VOC plume and to monitor MNA parameters and evaluate the effects of the treatment.</p> <p>ICs: Implement ICs that would restrict groundwater use and prohibit activities that could result in human exposure to VOCs in groundwater.</p>

be satisfied for a remedy to be eligible for selection. A comparison of the advantages and disadvantages of each alternative is accomplished by evaluating and comparing the five balancing criteria: (1) long-term effectiveness, (2) reduction of toxicity, mobility or volume through treatment, (3) short-term effectiveness, (4) implementability, and (5) cost. The modifying criteria consist of state and community acceptance, and are normally taken into consideration after comments on the Proposed Plan have been received from the regulatory agencies and the public.

A detailed comparison of the alternatives, as well as a detailed discussion of each technology, can be found in the Focused FS, which is available at the Information Repository listed on page 9 of this Proposed Plan. Table 3 presents a summary of the comparison of remedial alternatives based on the evaluation criteria.

SUSTAINABLE ENVIRONMENTAL REMEDIATION EVALUATION

As part of the evaluation of remedial alternatives with respect to short-term effectiveness, the sustainability of each alternative was evaluated with respect to metrics such as energy consumption, greenhouse gas generation, pollutant emissions, water consumption, and worker safety. The results of this sustainable environmental remediation evaluation are presented in the Focused FS, and were considered by the Navy during the evaluation of alternatives.

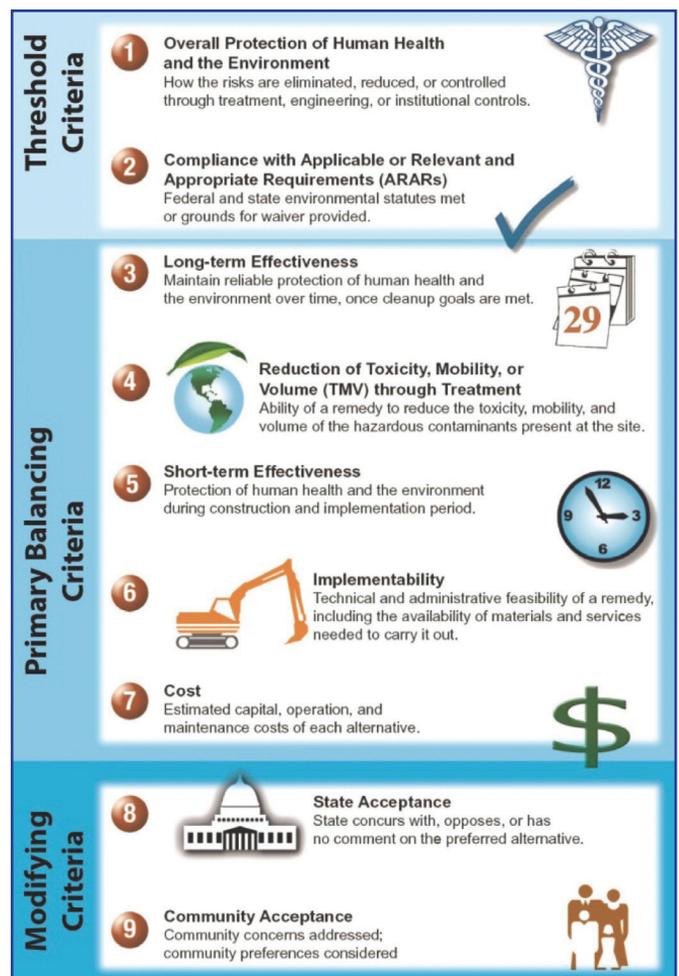


Figure 5. Criteria for Comparison of Alternatives



Hangars 2 and 3 in the southern area of Site 26

THE PREFERRED ALTERNATIVE

The Navy proposes Alternative 5: Biostimulation/Bioaugmentation Treatment, MNA, and ICs, to address the chlorinated VOC plume at Site 26. Alternative 5 would meet the project RAOs by permanently removing VOCs in the area of the plume where in situ treatment is performed, monitoring concentrations of VOCs throughout the plume, and preventing exposure to VOCs in groundwater at Site 26 in the short term and the long term by implementing ICs.

Alternative 5 was determined to best meet the evaluation criteria set forth by the NCP as follows:

- Achieves protection of human health and the environment through active treatment, MNA, and ICs;
- Meets potential chemical-specific ARARs as well as location- and action-specific ARARs (presented in Attachment 1);
- Achieves long-term effectiveness and permanence through active treatment of VOCs in groundwater and MNA;
- Achieves reduction of the toxicity and volume of the contaminant plume through treatment;
- Presents moderate short-term risks and environmental impacts;

- Is implementable as confirmed through a field-test in a treatability study at Site 28;
- Is estimated to be a cost-effective treatment method; and
- Is a sustainable alternative with respect to metrics such as energy consumption, greenhouse gas generation, pollutant emissions, water consumption, and worker safety.

The EPA and Water Board concur with the Navy's decision to modify the remedy for Site 26 groundwater. They support the Navy's selection of Alternative 5 because it is expected to meet the project RAOs by protecting human health and environmental receptors, as well as maintaining present and future beneficial groundwater uses in a shorter time frame and in a more cost-effective and sustainable manner than the current remedy. The preferred alternative may be modified in response to regulatory agency and public comments or new information.

Table 3 – Comparison of Remedial Alternatives

Alternatives	Overall Protection of Human Health and the Environment ^a	Compliance with ARARs ^a	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume through Treatment	Short-Term Effectiveness	Implementability	Costs (\$ Million)
Alternative 1: No Action	Not Protective	NA	NC	NC	NC	NC	(\$0)
Alternative 2: Monitored Natural Attenuation and Institutional Controls	Protective	Meets ARARs	●	○	●	●	(\$1.4)
Alternative 3: Optimized Pump and Treat and Institutional Controls	Protective	Meets ARARs	●	●	●	●	(\$5.7)
Alternative 4: Biotic/Abiotic Treatment, Monitored Natural Attenuation, and Institutional Controls	Protective	Meets ARARs	●	●	●	●	(\$3.7)
Alternative 5: Biostimulation/Bioaugmentation Treatment, Monitored Natural Attenuation, and Institutional Controls	Protective	Meets ARARs	●	●	●	●	(\$2.2)

Notes:

^a Overall protection of human health and the environment and compliance with ARARs are threshold criteria and alternatives are judged as either meeting or not meeting the criteria.

ARAR applicable or relevant and appropriate requirement

NA not applicable

NC not compared

○ Does Not Meet ● Good ● Excellent

COMMUNITY PARTICIPATION

Information on remediation of Site 26 has been made available to the public by the Navy, EPA and the Water Board through public meetings, the Administrative Record file, and notices published in local newspapers. The Navy and BRAC websites, as well as public meetings such as the Restoration Advisory Board (RAB) meetings that are held quarterly (every third month) are great sources of information.

The Navy, EPA and the Water Board encourage the community to become informed about Site 26 and the CERCLA activities that have been conducted at Moffett Field by visiting the information repository, reviewing the Administrative Record file, and attending public meetings. The Navy's website may be accessed at www.navy.mil and information on the RAB meetings may be found through the BRAC website at www.bracpmo.navy.mil.

The Navy will be holding a public comment period from April 15 through May 29, 2013 during which the public may submit comments on this Proposed Plan via mail, fax, or e-mail. A public meeting will be held on May 16, 2013 at the Mountain View Senior Center so that members of the community may personally submit written and oral comments.

INFORMATION REPOSITORY

Mountain View Public Library
585 Franklin Street
Mountain View, CA 94041
Telephone: (650) 903-6337

Hours:

Monday through Thursday 10:00 a.m. to 9:00 p.m.
Friday and Sunday 10:00 a.m. to 6:00 p.m.
Sunday 1:00 p.m. to 5:00 p.m.

ADMINISTRATIVE RECORD FILE

Contact: Ms. Diane Silva
NARA Certified Command Records Manager
Naval Facilities Engineering Command, Southwest
1220 Pacific Highway
Code EV33, NBSD Building 3519
San Diego, California 92132
Telephone: (619) 556-1280

Please call in advance to make an appointment
Monday through Friday between 8:30 a.m.
and 4:30 a.m.

HOW YOU CAN COMMENT ON THE NAVY'S PROPOSED PLAN

There are two ways to provide comments during this period:

1. **Public Comment Period** – Provide written comments by mail, e-mail, or fax (no later than May 29, 2013) to Scott Anderson, BRAC Environmental Coordinator.

Mr. Scott D. Anderson

Navy BRAC Program Management Office West
1455 Frazee Road, Suite 900
San Diego, CA 92108-4310
Fax: (619) 532-0940



Comments may be submitted electronically to Mr. Anderson at scott.d.anderson@navy.mil

2. **Public Meeting** – Written or oral comments will also be accepted during the public meeting for the Proposed Plan, which will be held on May 16, 2013 from 7:00 to 9:00 p.m. at the Mountain View Senior Center, 266 Escuela Avenue in Mountain View, California. A court reporter will be present at the meeting to record all verbal public comments.

This Proposed Plan is the Navy's invitation to the community to comment on the preferred alternative for Site 26. Community acceptance will be evaluated after the conclusion of the public comment period and will be documented in the Responsiveness Summary section attached to the cleanup decision document. A final decision on the remedy for Site 26 will be made after comments submitted during the public comment period have been considered.

PROJECT CONTACTS

NAVY

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Water Board

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Quality Control Board
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Oakland, CA 94612
(510) 622-2440
ewells@waterboards.ca.gov

GLOSSARY OF TERMS

1,1-Dichloroethene (DCE): A degradation product of trichloroethene (TCE) - one of six COCs present at Site 26 Moffett Field.

1,2-Dichloroethane (DCA): A chlorinated solvent used to dissolve resins and fats, also formerly used as an additive in leaded gasoline - one of six COCs present at Site 26 Moffett Field.

1,2-DCE: A chlorinated solvent used for waxes, resins, fats and oils; and a degradation product of TCE - one of six COCs present at Site 26 Moffett Field.

Administrative Record: The reports and historical documents used in selection of cleanup or environmental management alternatives.

Applicable or Relevant and Appropriate Requirements (ARARs): Federal, state, and local regulations and standards determined to be legally applicable or relevant and appropriate to remedial actions at a CERCLA site.

Base Realignment and Closure (BRAC): A program established by Congress under which Department of Defense Installations undergo closure, environmental remediation, and property transfer to other federal agencies or communities for reuse.

Biostimulation/Bioaugmentation Treatment: Treatment of groundwater that involves the injection of nutrients, buffering agents, and externally cultured bacteria to facilitate completion of the reductive dechlorination process (see definition below) of chlorinated VOCs in groundwater to break down more toxic VOCs into nontoxic ethene/ethane by-products.

Biotic/Abiotic Treatment: Treatment of contaminated groundwater that involves the injection of chemical additives that contain zero-valent iron and a slow-release organic electron donor to facilitate reductive dechlorination (see definition below) of chlorinated VOCs in groundwater to break down more toxic VOCs into nontoxic ethene/ethane by-products.

Chemicals of Concern (COCs): Chemicals identified as potentially posing a threat to human health or the environment.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): A law establishing (1) a program to identify hazardous waste sites, (2) procedures for cleaning up the sites to levels protective of human health and the environment, and (3) methods to evaluate damages to natural resources. It is commonly known as Superfund.

Ecological Risk Assessment (ERA): An evaluation of the likelihood that plant or animals exposed to contaminants at a site would suffer harm.

Explanation of Significant Differences (ESD): A decision document that identifies significant changes made to a remedy that does not fundamentally alter the overall cleanup approach chosen for implementation at a CERCLA site in the ROD. The ESD describes the nature of the change, summarizes the information that led to making the changes, and affirms that the revised remedy complies with the NCP and the statutory requirements of CERCLA. The ESD is signed by the Navy, EPA, and Water Board.

Feasibility Study (FS): A study that identifies and evaluates potential cleanup methods based on their effectiveness, availability, cost and other factors.

Human Health Risk Assessment (HHRA): An evaluation of the likelihood that humans exposed to contaminants at a site would suffer harm.

In Situ: In place; identifies an action or process as occurring within a given medium, such as groundwater or soil.

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

GLOSSARY OF TERMS (continued)

Institutional Controls (ICs): Legal or administrative mechanisms used to limit human exposure to hazardous substances and protect the integrity of the remedy. ICs may include deed restrictions, covenants, easements, laws, and regulations.

Maximum Contaminant Level (MCL): The maximum permissible level of a contaminant in water which is delivered to any user of a public water system.

Monitored Natural Attenuation (MNA): A proven technology used to monitor or test the progress of natural attenuation processes that can degrade contaminants in soil or groundwater. These processes may include biological degradation by naturally occurring microbes, sorption (sticking) to soil, or dilution due to mixing with clean water.

National Oil and Hazardous Substances Pollution Contingency Plan (NCP): The basis for government responses to oil and hazardous substances spills, releases, and sites where these materials have been released.

National Priorities List (NPL): A list of sites that are national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories. Intended primarily to guide the EPA in determining which sites warrant further investigation.

Preferred Alternative: The remedial alternative selected by the Navy, in conjunction with the regulatory agencies, that best satisfies the RAOs and remediation goals based on the evaluation of remedial alternatives presented in the FS report.

Proposed Plan: A document that reviews the remedial alternatives presented in the FS, summarizes the recommended remedial action, explains the reasons for recommending the action, and notifies the community of the proposed remediation.

Pump-and-Treat: Groundwater is pumped from extraction wells installed in the aquifer, and is treated in an aboveground treatment system.

Record of Decision (ROD): A decision document that identifies the remedial alternative chosen for implementation at a CERCLA site. The ROD is based on information from the RI and FS Reports, public comments, and community concerns. The ROD is signed by the Navy, EPA, and Water Board.

Record of Decision Amendment (ROD Amendment): A decision document that identifies the remedial alternative chosen for implementation at a CERCLA site that changes the selected remedy chosen for

implementation in the original ROD. The ROD Amendment is based on information from the RI and FS Reports, post-ROD implementation data evaluations, public comments, and community concerns. The ROD Amendment is signed by the Navy, EPA, and Water Board.

Reductive Dechlorination: A term that describes the degradation of chlorinated compounds in soil and groundwater by chemical and/or biological processes. If enough organic electron donors and the appropriate strains of microbial bacteria are present, the process can proceed until all of the chlorine atoms are removed, and TCE and PCE are dechlorinated completely via DCE and VC to ethene, a harmless end-product.

Remedial Action Objectives (RAOs): A statement containing cleanup goals for the protection of one or more receptors from one or more chemicals in a specific medium (such as soil, groundwater, or air) at a site.

Remedial Investigation (RI): The first of two major studies that must be completed before a decision can be made about how to remediate a site (the FS is the second study); the RI is designed to delineate the nature and extent of contamination and to estimate risks presented by contamination at a site.

Remediation Goal: Chemical concentration limit that provides a numerical goal for the remedial alternatives based on federal or state regulations and cleanup standards (MCLs).

Responsiveness Summary: Serves the dual purposes of: (1) presenting stakeholder concerns about the site and preferences regarding the remedial alternatives; and (2) explaining how those concerns were addressed and the preferences were factored into the remedy selection process.

Tetrachloroethene (or Perchloroethylene; PCE): A chlorinated solvent used in dry cleaning and metal degreasing - one of six COCs present in groundwater at Site 26 Moffett Field.

Trichloroethene (TCE): A chlorinated solvent used in metal degreasing, and a degradation product of PCE - one of six COCs present at Site 26 Moffett Field.

Vinyl Chloride (VC): A degradation product of 1,2-DCE and 1,1-DCE - one of six COCs present at Site 26 Moffett Field.

Volatile Organic Compounds (VOCs): Organic (carbon-containing) compounds that evaporate readily at room temperature. VOCs are found in industrial solvents commonly used in dry cleaning, metal plating and machinery degreasing operations.

ATTACHMENT 1: APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

CERCLA requires that remedial actions meet federal or state (if more stringent) environmental standards, requirements, criteria, or limitations that are determined to be ARARs. Substantive provisions of the requirements listed below are ARARs that must be met by the preferred remedy.

Chemical-Specific ARARs

- Health based national primary drinking water standards for public water systems [maximum contaminant levels (MCLs)] under the Safe Drinking Water Act (SDWA), Title 40 of the Code of Federal Regulations (40 CFR), Section (§) 141.61 (a) and (c)
- MCL goals (MCGLs) that are pertinent to known or anticipated adverse health effects (also known as recommended MCLs) under the SDWA, 40 CFR, §§141.50-141.51
- Resource, Conservation, and Recovery Act (RCRA) hazardous waste definition, California Code of Regulations (CCR), Title 22, §§ 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100
- RCRA groundwater protection standards, CCR, Title 22, §66264.94, except 66264.94(a)(2) and 66264.94(b)
- Non-RCRA hazardous waste definition, CCR, Title 22, §§66261.22(a)(3) and (4), 66261.24(a)(2)-(a)(8), 66261.101, 66261.3(a)(2)(C) or 66261.3(a)(2)(F)
- State MCL list (for groundwater), CCR, Title 22, §64444
- Water Quality Control Plan for the San Francisco Bay Basin (Region 2) (California Water Code (CWC) §13240)

Location-Specific ARARs

- Executive Order No. 11988 (Floodplain Management), 40 CFR §6.302(b) and 40 CFR pt. 6, app. A, §6(a)(1),(3), and (5) (at the end of §6.1007)
- Clean Water Act (CWA), 33 United States Code (U.S.C.), §1344 and 40 CFR 6, Appendix A; CWA §§ 402 and 404; and 40 CFR 230 and 231
- National Historic Preservation Act, 16 U.S.C., §470-470x-6; 36 CFR, pt. 800; and 40 CFR, §6.301(b)
- Coastal Zone Management Act, 16 U.S.C., §1456(c); and 15 CFR, §930
- Migratory Bird Treaty Act, 16 U.S.C., §703

Action-Specific ARARs

- RCRA requirements for generation, storage, and monitoring of hazardous waste, and monitoring constituents of concern CCR, Title 22, §§66262-66264
- Water quality criteria for classifying the beneficial use of groundwater, SWRCB Res. 88-63 (Sources of Drinking Water Policy);
- Establishment of policies and procedures for the oversight of investigations and cleanup and abatement activities resulting from discharges of waste that affect or threaten water quality, SWRCB Res. 92-49 (Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under CWC §13304) (CWC §13307);
- Establishment of water quality objectives, the Basin Plan, and SWRCB's Water Quality Control Plan (Chapters 2, 3 and 4);
- Compliance monitoring, CCR, Title 27, §20410;
- Requirements on managing discharges to land (Title 27, §20200/Title 23, §2520), and siting requirements of Title 27 or 23 and waste contained or left in place must comply with Title 27 or 23 to the extent feasible, CCR, Title 27, §20090(d)
- Requirement for a covenant imposing appropriate limitations on land use following facility closure, corrective action, remedial or removal action, or other response actions undertaken, CCR, Title 22, §67391.1
- Requirement that provides conditions under which land-use restrictions will apply to successive owners of the land, California Civil Code (CCC), §1471

*Affix
Postage*

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**PROPOSED PLAN FOR GROUNDWATER CLEANUP,
FORMER NAVAL AIR STATION MOFFETT FIELD,
Installation Restoration Site 26
Moffett Field, California**

Public Comment Period: April 15 to May 29, 2013
Proposed Plan Public Meeting: May 16, 2013

