

Proposed Plan/Draft Remedial Action Plan for Marine Corps Air Facility Tustin



January 2000

Tustin, California

Marine Corps/Navy Proposes No Further Action at Three IRP Sites and Nine Areas of Concern

This Proposed Plan/Draft Remedial Action Plan (referred to as the Plan) provides an overview of the environmental investigation results for three Installation Restoration Program (IRP) sites and nine Areas of Concern (AOCs) at MCAF Tustin (collectively referred to in this document as sites or locations). These 12 locations comprise Operable Unit 2 at MCAF Tustin (see map on page 3). Each operable unit represents one component of the environmental investigation and cleanup program at MCAF Tustin. This Plan also presents the Marine Corps/Navy proposal for no further action at these sites, and supporting information that forms the basis for this proposal.

We invite you to review and provide input on this Proposed Plan/Draft Remedial Action Plan during the January 2 to January 31, 2000 public comment period. You may submit your written comments to us and we will consider them in reaching our final decision for each site (see the box below for details). Responses to your comments will be incorporated

On July 2, 1999, operational closure of all military activities at MCAF Tustin was completed. The Marine Corps' mission at the Facility was incorporated into Marine Corp Air Station Miramar operations in San Diego, California.

into a subsequent decision document known as the Record of Decision/Final Remedial Action Plan.

The determination that no further action is required at these 12 locations is based on the results of extensive field investigations, laboratory analyses, examination of current and future conditions, and a thorough assessment of potential human health risks at each location.

The MCAF Tustin Base Realignment and Closure (BRAC) Cleanup Team, made up of representatives from the Marine Corps, U.S. Environmental Protection Agency (U.S. EPA), and California Environmental Protection Agency (Cal-EPA), has carefully evaluated the investigation results. The team has determined that no further action is required at the sites since the risk levels fall within U.S. EPA's range of allowable or generally allowable risks for protection of human health and the environment. Land use restrictions and environmental monitoring are not necessary at these sites.

The reports describing the field investigations, laboratory analyses, and risk assessments are part of the MCAF Tustin Administrative Record. These documents are available for review at MCAF Tustin and in the Information Repository at the University of California at Irvine's Main Library (see page 14).

Opportunities for Community Involvement



Public Meeting January 13, 2000 6:30-7:30 p.m.

Location: MCAF Tustin, Building 523—Enter at Main Gate on Redhill Avenue

You are invited to this community meeting to discuss the information presented in this Proposed Plan/Draft Remedial Action Plan for no further action at the three IRP sites and nine AOCs. Marine Corps/Navy representatives will provide visual displays and information on the environmental investigations and the no further action proposals. You will have the opportunity to ask questions and formally comment on the no further action proposals.

Public Comment Period January 2 to January 31, 2000

We encourage you to comment on this Proposed Plan/Draft Remedial Action Plan and supporting documents during the 30-day public comment period. Comments may be submitted orally or in writing at the public meeting, or you can mail written comments **postmarked no later than January 31, 2000** to: Base Realignment and Closure, Attn: Keith Forman, MCAF Tustin, BRAC Environmental Coordinator, P.O. Box 51718, Irvine, CA 92619-1718. Comments may also be sent to Mr. Forman by fax [(949) 653-7319] or by e-mail [formanks@efds.w.navy.mil] **no later than January 31, 2000**. Public comments received during this period, or in person at the public meeting mentioned above, will be considered in the final decision-making process for the no further action for the three IRP sites and nine AOCs.

Environmental Investigation Summary

This Plan presents a description of three IRP sites and nine AOCs, an overview of the methods used to evaluate the potential human health risks, and the results of the evaluation process leading to the recommendation for no further action. Figure 1 (page 3) shows the location of the IRP sites and AOCs. All 12 locations were identified through initial environmental studies that examined historical documents and photographs, and past use of hazardous substances at MCAF Tustin, including fuels, oils, and solvents.

Following the initial environmental studies, the 12 locations were subjected to detailed field investigations and evaluations. The majority of the investigations were conducted from 1995 to early 1997 and managed concurrently under three similar environmental investigation programs. Specifically, these include the Remedial Investigation (RI), Expanded Site Inspection (ESI), and Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) programs.

The primary document supporting the Marine Corps/Navy proposal for no further action at the 12 locations at MCAF Tustin is the Final RI Report for Operable Units 1 and 2 (November 1997). The Final ESI and RFA are supporting documents. The results of the technical evaluations and risk assessments presented in the investigation reports are summarized in this Plan. For locations where the public can review these reports and supporting documents see page 14. Throughout this Plan, the term “background levels” (of chemicals) is used. Background levels refer to the naturally occurring range of chemical concentrations that are found in the native soil and groundwater at MCAF Tustin property. Concentrations of chemicals that are less than or equal to background levels are considered to be naturally occurring and not a result of past facility operations.

Acronym List

AOC	Area of Concern
AR	Administrative Record
BCT	BRAC Cleanup Team
BRAC	Base Realignment and Closure
Cal-EPA	California Environmental Protection Agency
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DTSC	Department of Toxic Substances Control
ESI	Expanded Site Inspection
IRP	Installation Restoration Program
MCAF	Marine Corps Air Facility
NFA	No Further Action
PAHs	Polynuclear Aromatic Hydrocarbons
RAB	Restoration Advisory Board
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RI	Remedial Investigation
ROD	Record of Decision
SVOCs	Semi-volatile Organic Compounds
TCE	Trichloroethene
TPH	Total Petroleum Hydrocarbons
TRPH	Total Recoverable Petroleum Hydrocarbons
U.S. EPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds



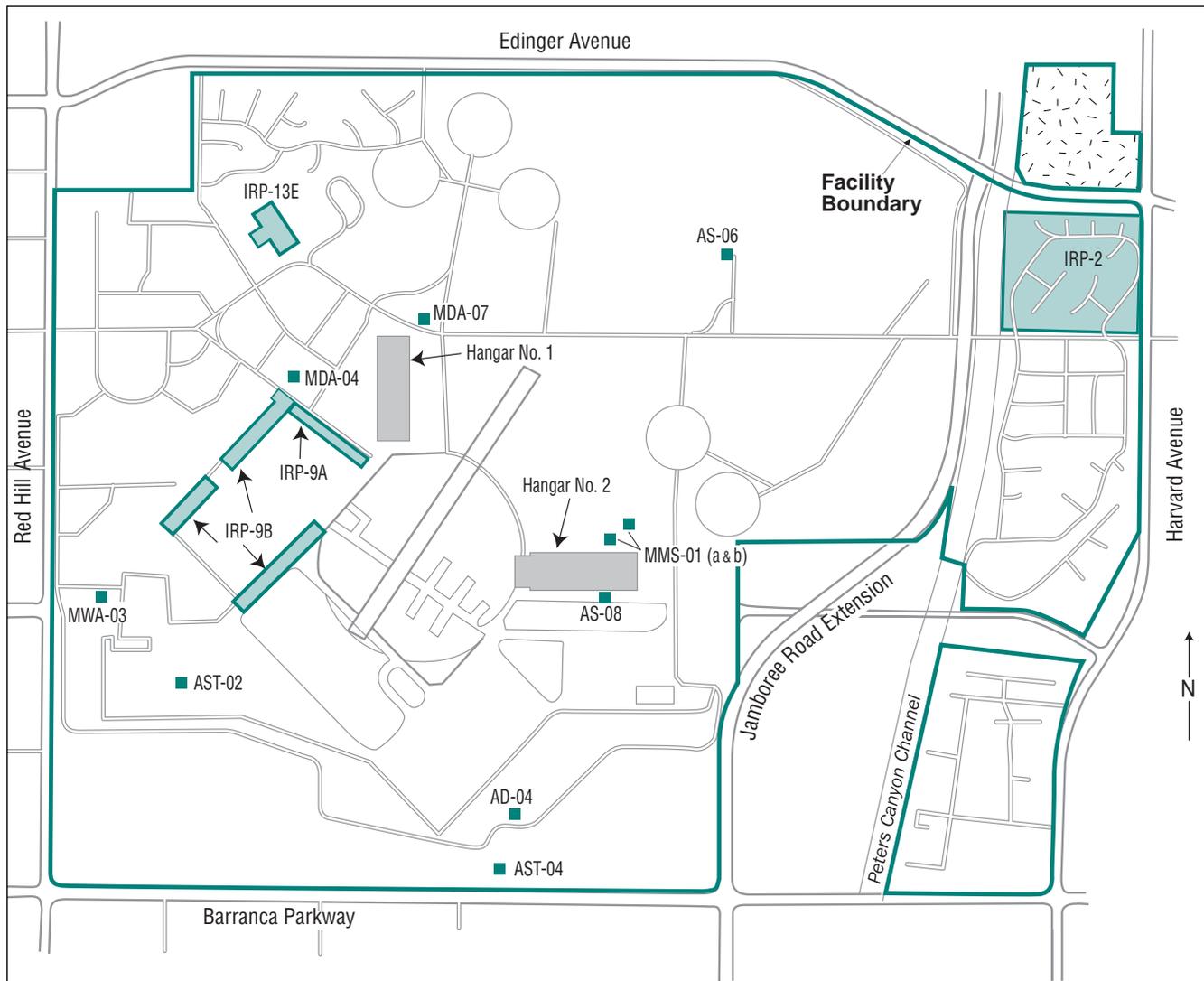
Methods Used to Evaluate Sites and AOCs

Risk Assessment—Once soil and groundwater have been sampled and the types and concentrations of chemicals present at a site or AOC are known, a risk assessment is performed to determine the potential impact of the chemicals on human receptors. The U.S. EPA provides guidelines for how to perform the risk assessment and evaluate the results. Risk assessments were performed for all the sites and AOCs in this Plan and are an important component in the decision of whether the area needs to be remediated or can be considered for no further action.

Leaching Analysis—Even though chemicals in groundwater may not currently pose an unacceptable risk, chemicals in soil may be transported to groundwater when surface water infiltrates downward through the soil. As surface water passes through the soil, the water may dissolve (leach) chemicals, transporting them to groundwater. In several instances, a leaching analysis was performed to determine whether chemicals in soil may pose a future threat to groundwater quality. The analysis determined to what extent chemicals could be leached from the soil and whether or not the resulting concentrations of chemicals in groundwater would be higher than regulatory threshold limits. In most cases, a second risk assessment was then performed to determine if the future risks due to groundwater are still allowable.

Geochemical Evaluation—The distribution of metals in groundwater is not uniform and is typically determined by the chemical composition of the soil and groundwater. Because of the variable distribution of metals in groundwater, a geochemical evaluation was performed to determine whether metals found at any given location are site-related or occur naturally.

Figure 1 MCAF Tustin – Locations of OU-2 No Further Action IRP Sites and Areas of Concern



Legend

- IRP Sites
- Areas of Concern (AOC)
- Roads
- Facility Boundary
- Hangars

IRP Sites

- IRP-2 – Oil Disposal Area
- IRP-9 (A & B) – Hangar No. 1 Line Shacks and Apron 1
- IRP-13E – Drum Storage Area No. 3, East

Areas of Concern

- AD-04 – Aerial Photo-Identified Possible Disposal Trench
- AS-06 – Aerial Photo-Identified Possible Temporary Storage Unit
- AS-08 – Aerial Photo-Identified Storage Area
- AST-02 – Aerial Photo-Identified Possible Aboveground Storage Tank
- AST-04 – Aerial Photo-Identified Storage Unit
- MDA-04 – Miscellaneous Disposal Area
- MDA-07 – Miscellaneous Disposal Area
- MMS-01 – Major Spill Area
- MWA-03 – Former Wash Pad

Operable Units at MCAF Tustin

To effectively manage the overall cleanup effort at MCAF Tustin, IRP sites and AOCs have been organized into four Operable Units (also called OUs). Each operable unit represents one component of the comprehensive environmental investigation and cleanup program underway at MCAF Tustin. The above map only shows IRP sites and AOCs for OU-2. For information on the other OUs, see page 14.

- OU-1—three IRP Sites (3, 12, and 13S).
- **OU-2—three IRP sites and nine AOCs shown on the map and addressed in this Plan.**
- OU-3—the Moffett Trenches and Crash Crew Burn Pits (IRP Site 1).
- OU-4—six IRP Sites (5, 6, 8, 11, 13W, and 16); and six AOCs (DSS-01, DSS-02, MDA-02, MMS-04, MMS-05, and ST-67) where no action is anticipated for soil, but further evaluation of groundwater is required.

Site Summary Descriptions and Recommendations

The following summary descriptions and recommendations are organized into three groups: 1) locations where the human health risks are allowable; 2) locations where the human health risks are within the range considered generally allowable by U.S. EPA and a risk management decision has been made that no cleanup action is required; and 3) locations that once posed a human health risk, but were cleaned up to reduce the risk to an allowable or generally allowable level. Readers are advised to consult pages 10 through 11 for a discussion of the Human Health Risk Assessment process to aid in understanding site descriptions below. Table 1 on page 10 explains the health risks and ranges for protecting human health.

The individual site summaries presented below briefly describe each site and explain the investigation process, present the chemicals of potential concern, list the environmental studies conducted, and provide the rationale for recommending no further action. The Marine Corps/Navy recommendations are based on the results of environmental investigations, fate and transport evaluations, and human health risk assessments conducted for each site. In several instances a leaching analysis or geochemical evaluation was also performed to support the no further action recommendation. Explanations of the leaching analysis and geochemical evaluation are presented on page 2.

Site locations are shown on page 3. Definitions of chemical terms discussed in the descriptions and throughout the Plan are on page 5. Risk assessment and leaching analysis results are summarized in Table 2 on page 12.

The sites and AOCs included in this Plan were evaluated and were determined to require no further action. However, IRP-9, AS-08, MDA-04, and MDA-07 are located in the vicinity of large VOC plumes that originate from three Operable Unit 1 sites. Therefore, groundwater at IRP-9, AS-08, MDA-04, and MDA-07 is being addressed as part of the Operable Unit 1 remedial action. Since the need for any remedial action of groundwater would be due to activities that occurred at other sites, IRP-9, AS-08, MDA-04, and MDA-07 are still considered no action sites and AOCs.

Locations where human health risks are allowable

The results of the risk assessment calculations indicate that the potential human health risks are less than 1 additional cancer case per 1,000,000 people (1×10^{-6}) at the five following sites. In accordance with U.S. EPA and Cal-EPA guidelines, potential risks less than one additional case per 1,000,000 people (or 1×10^{-6}) are considered allowable, and no cleanup action is necessary. Table 2 on page 12 summarizes the soil and groundwater risk results for these sites.

■ AOC AS-06

Aerial Photo-Identified Possible Temporary Storage Unit

Description

This site consists of a photo-identified former hazardous materials storage unit that was used between 1953 and 1975. There is currently no visible evidence of the storage unit, and the area is now used for agricultural purposes. Soil was investigated. Chemicals reported in soil included VOCs, PAHs, and a metal (silver). Groundwater was screened, but no formal samples were collected. No chemicals above background levels were reported in groundwater. Because of the potential for future release of the VOC chloroform from soil to groundwater, a leaching analysis was conducted.

Chemicals of Potential Concern

Soil: VOCs, PAHs, metal (silver)

Groundwater: No formal samples collected

Studies

Final RFA Report (4/97):

NFA recommended for soil

Final RI Report (11/97):

NFA recommended for groundwater

Recommendation

Based on the results of the risk assessment for soil (which indicated that the chemicals in soil do not pose an unacceptable human health risk) and the results of the leaching analysis (which indicated that chloroform will not cause an unacceptable future health risk in groundwater), the Marine Corps/Navy proposes no cleanup action for this AOC.

■ AOC AS-08

Aerial Photo-Identified Storage Area

Description

This site is believed to have been a storage area for 55-gallon drums of hazardous materials between 1976 and 1988. The site is currently covered with vegetation. Soil was investigated and chemicals reported in soil included VOCs, PAHs, and metals. Groundwater samples were not collected beneath the site. Because of the potential for future release of the VOC 1,1,2,2-tetrachloroethane from soil to groundwater, a leaching analysis was conducted.

Chemicals of Potential Concern

Soil: VOCs, PAHs, metals

Groundwater: No samples collected

Studies

Final RFA Report (4/97):
NFA recommended for soil

Final RI Report (11/97):
NFA recommended for groundwater

Recommendation

Based on the results of the risk assessment for soil (which indicated that the chemicals currently in soil do not pose an unacceptable human health risk) and the results of the leaching analysis (which indicated that VOCs will not cause a future health risk), the Marine Corps/Navy proposes no cleanup action for this AOC. Although groundwater at AS-08 does not require remediation because of site-specific releases, the AOC is located within a large VOC plume that originates at OU-1 Site IRP-3. Therefore, groundwater at AS-08 is being addressed as part of the remedial action for OU-1.

■ AOC AST-02

Aerial Photo-Identified Possible Aboveground Storage Tank

Description

This site was a possible tank that may have stored petroleum fuels, oils, or lubricants between 1946 and 1988. The site is now covered by Aircraft Parking Apron No. 4. Soil samples were not collected because of the presence of the paved Parking Apron. Groundwater was investigated. Chemicals reported in groundwater included metals. A geochemical evaluation was performed to determine if the concentrations of metals (primarily chromium and cadmium) in groundwater were within naturally occurring background levels.

Chemicals of Potential Concern

Soil: No samples collected

Groundwater: Metals

Studies

Final RI Report (11/97):
NFA recommended for groundwater

Recommendation

The Marine Corps/Navy proposes no cleanup action based on the results of the geochemical evaluation for groundwater, which shows metals are within background concentrations.

■ AOC MDA-07

Miscellaneous Disposal Area

Description

This site is an area reportedly used in the 1950s as a blimp and automobile wash area. Unknown cleaning fluids were used to wash the blimps. Automobile cleaners included detergents and solvents. Soil was investigated and chemicals reported in soil included VOCs and a metal (arsenic). Groundwater was not investigated. Because of the potential for future release of the VOC TCE from soil to groundwater, a leaching analysis was conducted.

Chemicals of Potential Concern

Soil: VOCs, metal (arsenic)

Groundwater: No samples collected

Definitions of Chemical Terms

- **VOCs** (volatile organic compounds) make up a general category of organic (carbon-containing) compounds that evaporate easily at room temperature. They are commonly used for machinery and parts degreasing, paint stripping, and other industrial operations. At MCAF Tustin, historical activities have included more than 40 years of aircraft maintenance that used industrial solvents, like trichloroethene (TCE), that are categorized as VOCs. Within the category of VOCs, there are known cancer-causing compounds. VOCs identified as chemicals of potential concern at the sites presented in this plan include chloroform, 1,2-dichloroethane, methylene chloride, 1,1,2,2-tetrachloroethane, and TCE.
- **SVOCs** (semivolatile organic compounds) comprise another general category of organic compounds. These compounds evaporate at a slower rate than VOCs. As with VOCs, there are known cancer-causing compounds within the category of SVOCs.
- **PCBs** (polychlorinated biphenyls) are a specific class or group of SVOCs and are known cancer-causing compounds. Aroclor-1260 is a PCB compound detected at one site (IRP-13E) presented in this plan.
- **TPH** (total petroleum hydrocarbons) and **TRPH** (total recoverable petroleum hydrocarbons) are chemical components of fuels. The individual compounds that make up TPH or TRPH are evaluated for potential health effects.
- **PAHs** (polynuclear aromatic hydrocarbons) are a specific class or group of SVOCs, and some are cancer-causing compounds. Benzo(a)pyrene is a cancer causing PAH identified as a chemical of concern at several sites presented in this plan.
- **Metals** found at the IRP sites and AOCs include aluminum, antimony, arsenic, beryllium, cadmium, chromium, lead, manganese, molybdenum, selenium, silver, and thallium. Arsenic, beryllium, and chromium are known to cause cancer. Aluminum, cadmium, lead, manganese, molybdenum, and selenium are noncancer-causing chemicals. Arsenic, cadmium, chromium, manganese, and selenium are found in the soils native to the MCAF Tustin area.



Studies

Final RFA Report (4/97):
NFA recommended for soil

Final RI Report (11/97):
NFA recommended for groundwater

Recommendation

Based on the results of the risk assessment for soil (which indicated that the chemicals present in soil do not pose an unacceptable health risk), and the leaching analysis (which indicated that TCE will not cause an unacceptable future health risk in groundwater), the Marine Corps/Navy proposes no cleanup action for soil at this site. Although groundwater at MDA-07 does not require remediation because of site-specific releases, this AOC is located in an area adjacent to a large VOC plume that originates at OU-1 Site IRP-12. Therefore, groundwater at MDA-07 is being addressed as part of the remedial action for OU-1.

■ AOC MMS-01

Major Spill Area

Description

This site is comprised of two areas: an unpaved soil area (MMS-01a) and a storm drain (MMS-01b) (see Figure 1). In 1989, approximately 3,000 gallons of JP-5 were spilled onto the ground. The spilled fuel ran into the unpaved soil area and into the storm drain.

Soil was investigated at AOC MMS-01. Chemicals reported in soil included VOCs, PAHs, and TRPH. Groundwater was screened but no formal samples were collected. No chemicals above background levels were reported in groundwater. Because of the potential for future release of the VOC methylene chloride from soil to groundwater, a leaching analysis was conducted.

Chemicals of Potential Concern

Soil: VOCs, PAHs, TRPH
Groundwater: No formal samples collected

Studies

Final RFA Report (4/97):
NFA recommended for soil

Final RI Report (11/97):
NFA recommended for groundwater

Recommendation

Based on the results of the risk assessment for soil (which indicated that the chemicals currently present in soil do not pose an unacceptable health risk) and the results of the leaching analysis (which indicated that methylene chloride will not cause an unacceptable future health risk in groundwater), the Marine Corps/Navy proposes no cleanup action for this AOC.

Locations where the human health risks are considered generally allowable

For the following four sites, the results of the risk assessment calculations indicate that the potential human health risks fall between 1 additional case per 10,000 people (or 1×10^{-4}) and 1 additional case per 1,000,000 people (or 1×10^{-6}). In accordance with U.S. EPA and Cal-EPA guidelines, risks within this range are considered generally allowable. However, a final decision as to whether or not a site should be subject to a cleanup action is based on a risk management decision made by the Marine Corps/Navy and regulatory agencies.

Risk management decisions were made by the regulatory agencies and the Marine Corps/Navy for each of the five locations described below. Factors that were considered in each of the decisions include 1) future land use(s), 2) the type, depth, and extent of contaminants found in the soil, and 3) the conservative nature of the U.S. EPA's risk assessment methodology. All risk assessments were calculated using the highest measured concentration or level of the contaminant(s) found at the sites. Table 2 on page 12 summarizes the soil and groundwater risk results for these sites.

■ IRP-13E

Drum Storage Area No. 3, East

Description

This site is a former drum storage area used to store drums containing hydraulic fluids, diesel fuel, leaded gasoline, oil, paint strippers, battery acids, and solvents between the mid-1960s and mid-1970s. Soil and groundwater were investigated. Chemicals reported in soil include TRPH, PCBs, pesticides, PAHs, SVOCs, and metals. No chemicals above background levels were reported in the groundwater beneath the site. Because of the potential for future releases of bis(2-ethylhexyl)phthalate, antimony, lead, and several additional chemicals from soil to groundwater, a leaching analysis was conducted.

Chemicals of Potential Concern

Soil: TRPH, PCBs, pesticides, PAHs, SVOCs, metals
Groundwater: None identified

Studies

Final RI Report (11/97):
Recommended NFA for soil and groundwater

Recommendation

Based on the results of the risk assessment for soil (which indicated that the contaminants in soil do not pose an unacceptable human health risk) and the results of the leaching analysis (which indicated that chemicals present in soil will not leach to groundwater at concentrations above regulatory threshold limits for tapwater), the Marine Corps/Navy proposes no cleanup action for this site.

■ AOC AD-04

Aerial Photo-Identified Possible Disposal Trench

Description

This site was identified as a possible disposal trench located near the Armed Services Reserve Center Garage. The site is currently covered by vegetation, with no visible evidence of a former trench. Soil and groundwater were investigated. Chemicals reported in soil included VOCs, PAHs, PCBs, and metals. Metals were also reported in groundwater. Due to the presence of the metals chromium and molybdenum in groundwater and the potential for future release of chloroform from soil to groundwater, a geochemical evaluation and a leaching analysis were conducted.

Chemicals of Potential Concern

Soil: VOCs, PAHs, PCBs, metals

Groundwater: Metals

Studies

Final RFA Report (4/97):

NFA recommended for soil

Final RI Report (11/97):

NFA recommended for groundwater

Recommendation

Based on the risk assessments for soil and groundwater (which showed that the chemicals currently present do not pose an unacceptable human health risk), the geochemical evaluation (that showed that chromium and molybdenum do not exceed background levels in groundwater), and the leaching analysis (which showed that chloroform will not cause an unacceptable future health risk in groundwater), the Marine Corps/Navy proposes no cleanup action for this AOC.

■ AOC AST-04

Aerial Photo-Identified Storage Unit

Description

This site consists of a possible elevated tank identified in a 1966 aerial photograph. The AOC is now covered with vegetation and has no visible evidence of a former tank or stains on the soil. Soil and groundwater were investigated. Chemicals reported in soil included VOCs and PAHs. Chemicals reported in groundwater included metals. Due to the presence of some metals (primarily manganese) in groundwater, and the potential for future releases of VOCs and PAHs from soil to groundwater, a geochemical evaluation and leaching analysis were performed.

Chemicals of Potential Concern

Soil: VOCs, PAHs

Groundwater: Metals

Studies

Final RFA Report (4/97):

NFA recommended for soil

Final RI Report (11/97):

NFA recommended for groundwater

Recommendation

Based on the risk assessment for soil (which showed that chemicals currently present do not present an unacceptable human health risk) and the geochemical evaluation (which showed that metals in groundwater do not exceed background levels), and the leaching analysis (which showed that VOCs and PAHs will not leach to groundwater at concentrations above regulatory limits for tapwater), the Marine Corps/Navy proposes no cleanup action for this AOC.

■ AOC MDA-04

Miscellaneous Disposal Area

Description

This site is an area between Buildings 161, 262, and 263 that was identified as a general support equipment parking lot and maintenance area. Throughout the 1970s and 1980s, fuels and oils were spilled or leaked onto the ground. Soil and groundwater were investigated. Chemicals reported in soil included VOCs, PAHs, TRPH, PCBs, and a metal (arsenic). Chemicals reported in groundwater included VOCs and metals. Due to the potential for leaching of soils from soil to groundwater and the presence of some metals (primarily molybdenum) and the VOC 1,2-dichloroethane in groundwater, a leaching analysis, a geochemical evaluation, and an evaluation of the future impact of VOCs were performed.

Chemicals of Potential Concern

Soil: VOCs, PAHs, TRPH, PCBs, metal (arsenic)

Groundwater: VOCs, metals

Studies

Final RFA Report (4/97):

NFA recommended for soil

Final RI Report (11/97):

NFA recommended for groundwater

Recommendation

Based on the risk assessments for soil and groundwater (which showed that the chemicals present do not pose an unacceptable health risk), the leaching evaluation (which showed that VOCs will not leach to groundwater at concentrations exceeding regulatory limits for tapwater), the geochemical evaluation (which showed that molybdenum does not exceed background levels in groundwater), and the evaluation of VOCs (which showed that VOCs will have negligible future impact to groundwater), the Marine Corps/Navy proposes no cleanup action for this AOC. Although groundwater at MDA-04 does not require remediation because of site-specific releases, the AOC is located in an area adjacent to a large VOC plume that originates at OU-1 Site IRP-13S. Therefore, groundwater at MDA-04 is being addressed as part of the remedial action for OU-1.

Sites where cleanup actions have already occurred

For the following three sites, the results of the risk assessment calculations indicated that the potential human health risks were greater than 1 additional cancer case per 10,000 people (or 1×10^{-4}). These risks were considered by the regulatory agencies as unacceptable (see Table 2 on page 12). As such, cleanup (removal) actions were required at each of these sites. The removal actions are now complete and the current health risks at these sites are allowable or generally allowable.

■ IRP-2

Oil Disposal Area

Description

This site consists of a former oil disposal area that was used between 1970 and 1981. Approximately 4,400 to 6,600 gallons of waste oil containing JP-5, crankcase oil, hydraulic fluid, and solvents were disposed of on the site. Additionally, a pistol and trapshooting range were located within the site boundaries in the late 1970s, prior to the construction of base housing.

Soil and groundwater were investigated at IRP-02. Chemicals reported in soil included TRPH, VOCs, SVOCs, PAHs, pesticides, and some metals. Metals and TPH were reported in groundwater.

Based on the human health risk assessment performed at the time of the investigation, a removal action was recommended for soil. This action was conducted in 1997. A geochemical evaluation was also performed to evaluate metals (molybdenum, arsenic, and selenium) in groundwater.

Chemicals of Potential Concern

Soil: TRPH, VOCs, SVOCs, PAHs, pesticides, metals

Groundwater: Metals, TPH

Studies

Final ESI Report (10/96):

Recommended soil removal action

EE/CA Report (10/96):

Recommended soil be removed, treated, and reused

Final RI Report (11/97):

NFA recommended for groundwater

Non-Time-Critical Removal Action Memo (3/97):

Removal Action Work Plan

Closure Report for IRP-2 and IRP-9 (1/98):

NFA recommended for soil

Recommendation

Based on the successful soil removal action (which reduced the concentrations of chemicals in soil to levels that are protective of human health) and the geochemical evaluation (which showed that metals in groundwater do not exceed background levels), the Marine Corps/Navy proposes no further action at this site.

■ IRP-9 [IRP-9A, IRP-9B]

Hangar No. 1 Line Shacks and Apron 1

Description

This site consists of line shacks, four temporary hazardous substance storage units, and an area adjacent to Apron 1. From 1971 to 1982, jet fuel, hydraulic fluid, and motor oil were reportedly spilled at IRP-9A. In addition, a PAH apron study conducted in 1998 suggested that both IRP-9A and IRP-9B received contamination from helicopter emissions that were deposited on the apron and subsequently washed off onto the surface soil through rain or wash-water runoff.

Soil and groundwater were investigated at IRP-9. Chemicals reported in soil included VOCs, SVOCs, PAHs, TPH, pesticides, and metals. Chemicals reported in groundwater included VOCs and TPH.

Based on the human-health risk assessment performed at the time of the investigation, a removal action was recommended for two small areas of PAH-impacted soil at IRP-9A. This action was conducted in 1997. During the removal action, PAH contamination was also discovered at IRP-9B and a removal action was completed at this portion of the site in 1999.

Chemicals of Potential Concern

Soil: VOCs, SVOCs, PAHs, TPH, pesticides, metals

Groundwater: VOCs, TPH

Studies

Final ESI Report (10/96):

Recommended removal action for soil; recommended no further action for groundwater

EE/CA Report (10/96):

Recommended soil at IRP-9A be removed, treated, and reused

Non-Time-Critical Removal Action Memo (3/97):

Documented Marine Corps/Navy decision to perform soil removal at IRP-9A

Closure Report for IRP-2 and IRP-9 (1/98):

NFA recommended for soil at IRP-9A

Final PAH Apron Study (6/98):

Recommended soil removal at IRP-9B

Addendum to Non-Time-Critical Removal Action Memo (12/99):

Documented Marine Corps/Navy decision to perform soil removal at IRP-9B

Recommendation

Based on the soil removal action (which reduced the concentrations of chemicals in soil to levels that are protective of human health) and the risk assessment that showed that the concentrations of chemicals in groundwater are also protective of human health, the Marine Corps/Navy proposes no further action for this site. Although groundwater at IRP-9 does not require remediation because of site-specific releases, the site is located in an area adjacent to a large VOC plume that originates at OU-1 Site IRP-13S. Therefore, groundwater at IRP-9 is being addressed as part of the remedial action that is planned for OU-1.

■ AOC MWA-03

Former Wash Pad

Description

This site is a former concrete wash area (pad). The wash pad was in use through 1996. Oily water flowed to and through drains in the pad into an oil/water separator, which discharged to the off-base sanitary sewer system. Oils, solvents, and detergents were used on the pad during fueling equipment washing operations.

Soil and groundwater were investigated at MWA-03. Chemicals reported in soil included VOCs, PAHs, PCBs, TRPH, and metals. Metals were also reported in groundwater.

Based on the human health risk assessment performed at the time of the investigation, a removal action was recommended for soil. This action was conducted in 1997. A geochemical evaluation was also performed to determine if the concentrations of metals (arsenic, chromium, and thallium) in groundwater were within naturally occurring background levels.

Chemicals of Potential Concern

Soil: VOCs, PAHs, PCBs, TRPH, metals

Groundwater: Metals

Studies

Final RFA Report (4/97):

Soil removal action recommended

Final RI Report (11/97):

NFA recommended for groundwater

No Further Action Report, Closure of Site MWA-03 (3/98):

NFA recommended for soil

Recommendation

Based on the successful soil removal action (which reduced the concentrations of chemicals in soil to levels that are protective of human health) and the geochemical evaluation (which showed that metals in groundwater do not exceed background levels), the Marine Corps/Navy proposes no further action for this AOC.

Multi-Agency Environmental Team Concurs with No Further Action Proposals



The Base Realignment and Closure (BRAC) Cleanup Team (BCT), composed of the Marine Corps/Navy, the U.S. EPA, and the Cal-EPA, was established when MCAF Tustin was designated for closure. The primary goals of the BCT are to protect human health and the environment, to expedite the environmental cleanup, and to coordinate the environmental investigations and cleanup at the Facility.

The team also serves as the primary forum for assessing cleanup priorities and progress. The BCT obtains a consensus on issues regarding the Facility's environmental activities and makes a concerted effort to integrate reuse into the cleanup decisions.

The team completed its review of the Remedial Investigation Report for Operable Units 1 and 2, the Expanded Site Inspection Report, the RCRA Facility Assessment Report, and the closure reports for IRP-2, IRP-9, and MWA-03.

Discussions were held regarding the findings of the field investigations, the results of human health risk assessments, site closure plans and contamination cleanup level(s), and the recommendations presented by the Marine Corps/Navy.

Based on these discussions, the BCT agreed that cleanup actions or removal actions were required at three locations (IRP-2, IRP-9, and MWA-03) to reduce or eliminate potential human health risks. Removal actions occurred at these locations in 1997 and an additional removal action was completed at IRP-9 in 1999. Upon review of the closure reports for IRP-2, IRP-9, and MWA-03, the BCT concurred that no further action is necessary at these locations.

The BCT agreed that the potential human health risks at the remaining nine locations presented in this Proposed Plan/Draft Remedial Action Plan are within allowable or generally allowable risk ranges and no further evaluations or cleanup actions are needed.

Human Health Risk Assessment

The Marine Corps/Navy conducted human health risk assessments for each of the IRP sites and AOCs in accordance with federal and State guidelines. A human health risk assessment estimates the likelihood of health problems occurring if no cleanup action were taken at a site. To estimate the human health risks at each site the Marine Corps/Navy undertook a four-step process.

- **Step 1: Analyze Contamination**
- **Step 2: Estimate Exposure**
- **Step 3: Assess Potential Health Dangers**
- **Step 4: Characterize Site Risk**

IDENTIFYING CHEMICALS OF POTENTIAL CONCERN

IN STEP 1, the Marine Corps/Navy looked at concentrations of chemicals found at a site as well as past scientific studies on the effects these chemicals have had on people (or animals, when human studies are unavailable). The types and quantities of chemicals present in the soil, sediment, surface water, and groundwater at the three IRP sites and nine AOCs presented in this Plan were investigated under the RI, ESI, and/or RFA programs at MCAF Tustin.



Comparisons between site-specific concentrations and concentrations reported in past studies helped determine which contaminants are most likely to pose the greatest threat to human health.

IDENTIFYING EXPOSURE PATHWAYS

IN STEP 2, the Marine Corps/Navy considered the different ways that people might be exposed to the contaminants identified in Step 1, the concentrations that people might be exposed to, and the potential frequency and duration of exposure.

To establish a “worst case scenario,” the Marine Corps/Navy calculated residential health risks for the twelve sites. The Marine Corps/Navy calculated health risks assuming that residents live at a site for 30 years and are exposed to the chemicals identified in soil and groundwater at the sites daily.



Each of the risk assessments estimated risks for individuals exposed to on-site chemicals in soil and groundwater through ingestion (eating), inhalation of vapors or dust (breathing), and direct skin contact (touching).

ESTIMATING HEALTH HAZARDS

IN STEP 3, the Marine Corps/Navy used the information from Step 2 combined with information on the toxicity of each chemical to assess potential health risks. U.S. EPA considers two types of risk: cancer risk and non-cancer risk. The likelihood of any kind of cancer resulting from chemicals at a site is generally expressed as an upper bound probability; for example, a “1 in 10,000 chance.”

ESTIMATING HEALTH HAZARDS

In other words, for every 10,000 people that could be exposed, one additional cancer case may occur as a result of exposure to site contaminants. One additional cancer case means that one more person could get cancer from chemicals present at a site than would normally be expected to get cancer from all other causes.

For non-cancer health effects, U.S. EPA calculates a “hazard index.” A hazard index of 1 or greater

Table 1 Risk Ranges to Protect Human Health

Health Risks	Unacceptable Risks	Generally Allowable Risks	Allowable Risks
Cancer	More than 1 additional cancer case in a population of 10,000 (greater than 1×10^{-4})	1 additional cancer case in a population of 10,000 to 1 additional cancer case in a population of 1,000,000 (1×10^{-4} through 1×10^{-6})	Less than 1 additional cancer case in a population of 1,000,000 (less than or equal to 1×10^{-6})
Non-cancer	A hazard index greater than 1 should be evaluated further.	---	A hazard index less than 1

indicates that a lifetime of exposure to the chemical(s) may have potential for causing adverse health effects (e.g., respiratory distress) and should be evaluated further.

Calculated risk levels are an indication of potential risks, and are not absolute predictions that risk will occur at a certain level. Actual human exposures and risks are likely to be less than those calculated for the risk assessment. Assumptions made during the risk assessment process are designed to lead to an over estimation of potential risk and provide a margin of safety to protect public health and the environment.

CHARACTERIZING SITE RISKS



IN STEP 4, the Marine Corps/Navy and regulatory agencies determine whether site risks are great enough to cause health problems for people at or near the sites. The results of the three previous steps are combined,

evaluated, and summarized.

The U.S. EPA provides guidelines to be used to assess the types of chemicals, degree of exposure to the chemicals, and potential toxic effects of the chemicals of concern. To assist with the risk management deci-

sion, the U.S. EPA has established the risk ranges to protect human health. These ranges are presented in Table 1 on page 10.

RISK ASSESSMENT RESULTS

The health risks calculated for each of the three IRP sites and the nine AOCs proposed for no further action are presented on Table 2 on page 12.

For several sites where contamination occurred in the soil, the Marine Corps/Navy conducted a leaching analysis to evaluate the potential for contaminants to move from the soil into the groundwater. A description of the leaching analysis process is provided on page 2. In most cases, the results from the leaching analysis were used to estimate potential future health risks resulting from exposure to groundwater.



The potential future risks are shown in the right-hand columns of Table 2 on page 12. No unacceptable current or future health risks were identified in the soil or groundwater beneath the sites that are recommended for no further action.

Factors Considered When Making a Risk Management Decision

Many factors were considered when making the no further action recommendation or proposal at the three IRP sites and nine AOCs. The Marine Corps/Navy and regulatory agencies (also known as the BRAC Cleanup Team or BCT) incorporated input from specialists in the field, the Restoration Advisory Board (RAB), and the public into their decision-making process.

The BCT also carefully evaluated the following site-specific conditions of each property:

- The type, location, and concentration of chemicals observed in the environment
- The natural degradation of certain types of chemicals in the environment over time
- The quality of the data provided by the studies
- The planned future uses of the property
- The results from the conservative risk estimates

Table 2 Risk Assessment Results for No Further Action Sites

RISK ASSESSMENT RESULTS					LEACHING ANALYSIS RESULTS	
Site Name	Soil Cancer Risk	Soil Hazard Index	Current Groundwater Cancer Risk/Hazard Index		Future Groundwater Cancer Risk	Future Groundwater Hazard Index
Locations where human health risks are allowable:						
AOC AS-06	less than 1 additional case in 1,000,000	less than 1	Groundwater was screened, but no formal samples were collected.		5.6 additional cases in 1,000,000	less than 1
AOC AS-08	less than 1 additional case in 1,000,000	1	Groundwater samples were not collected.		6.4 additional cases in 1,000,000	less than 1
AOC AST-02	Soil samples were not collected		No contaminants were identified. Metals in groundwater were evaluated and found to be within background levels.		Not Performed	
AOC MDA-07	less than 1 additional case in 1,000,000	less than 1	Groundwater samples were not collected.		9.4 additional cases in 1,000,000	less than 1
AOC MMS-01	less than 1 additional case in 1,000,000	less than 1	Groundwater was screened, but no formal samples were collected.		1.4 additional cases in 1,000,000	less than 1
Locations where the human health risks are considered generally allowable:						
IRP-13E	1.3 additional cases in 100,000	less than 1	No contaminants were identified in the groundwater beneath the site.		Chemicals in soil are not predicted to leach to groundwater at concentrations above regulatory threshold limits for tapwater.	
AOC AD-04	1.5 additional cases in 1,000,000	less than 1	No contaminants were identified. Metals in groundwater were evaluated and found to be within background levels.		5.6 additional cases in 1,000,000	less than 1
AOC AST-04	3.2 additional cases in 1,000,000	less than 1	No contaminants were identified. Metals in groundwater were evaluated and found to be within background levels.		Chemicals in soil are not predicted to leach to groundwater at concentrations above regulatory threshold limits for tapwater.	
AOC MDA-04	1.1 additional cases in 100,000	less than 1	9.2 additional cases in 1,000,000 (cancer risk)	less than 1 (hazard index)	Chemicals in soil are not predicted to leach to groundwater at concentrations above regulatory threshold limits for tapwater.	
Sites where cleanup actions have already occurred:						
IRP-2	1 additional case in 100,000	2.6 due to naturally occurring metals	No contaminants were identified. Metals in groundwater were evaluated and found to be within background levels.		Not Performed	
IRP-9	maximum of 3.15 additional cases in 100,000	less than 1	1.8 additional cases in 100,000 (cancer risk)	less than 1 (hazard index)	Not Performed	
AOC MWA-03	less than 1 additional case in 1,000,000	less than 1	No contaminants were identified. Metals in groundwater were evaluated and found to be within background levels.		Not Performed	

Regulatory Framework for Remedial Action Plan Requirements



At MCAF Tustin, the lead regulatory oversight agency is Cal-EPA, Department of Toxic Substances Control (DTSC). Thus, this document as well as the subsequent Record of Decision/ Final Remedial Action Plan, must meet Cal-EPA DTSC Remedial Action Plan or RAP requirements. These requirements are summarized in the

table below. The DTSC has concurred that the referenced sections of the Remedial Investigation, Expanded Site Inspection, and RCRA Facility Assessment Reports, and the site closure reports satisfy the RAP requirements. In addition, this Proposed Plan/Draft Remedial Action Plan was prepared in accordance with Section 117(a) of CERCLA.

RAP Requirements	Documents Where Requirements Were Considered
<ul style="list-style-type: none"> ■ Health and safety risks posed by the conditions at the site. When considering these risks, DTSC or the Regional Water Quality Control Board shall consider scientific data and reports that may have a relationship to the site. 	<ul style="list-style-type: none"> ■ Final Remedial Investigation (RI) Report for Operable Units 1 and 2, 1997; Final Expanded Site Inspection (ESI) Report, 1996; Final RCRA Facility Assessment (RFA) Report, 1997; Final PAH Apron Study, 1998; Closure Report-Soil Removal Actions at Site IRP -2, Oil Disposal Area, and IRP-9 Hanger No. 1 Line Shacks, 1998; and No Further Action Report, Closure of Site MWA-03, 1998.
<ul style="list-style-type: none"> ■ The effect of contamination or pollution levels upon present, future, and probable beneficial uses of contaminated, polluted, or threatened resources. 	<ul style="list-style-type: none"> ■ RI Sections 7 and 8 (Vol. III); ESI Sections 6 and 7; RFA Section 5 (Vol. I), and Section 6 (Vol. II).
<ul style="list-style-type: none"> ■ The effect of alternative remedial action measures on the reasonable availability of groundwater resources for present, future, and probable beneficial uses. 	<ul style="list-style-type: none"> ■ No Feasibility Study was conducted for these sites and an evaluation of the regulatory requirements was not performed. For IRP-2 and IRP-9, Non-Time-Critical Removal Action Memorandum/Removal Action Work Plan, 1997; and the Addendum to the Non-Time-Critical Removal Action Memorandum/Removal Action Work Plan, 1999; and for MWA-03, RFA Sections 5 and 6.
<ul style="list-style-type: none"> ■ Site-specific characteristics including the potential for off-site migration of hazardous substances, the surface soil, and the hydrogeologic conditions, as well as pre-existing background contamination levels. 	<ul style="list-style-type: none"> ■ RI Sections 1, 4, (Vol. I), and 5 (Vol. III); ESI Sections 2, 3, 4, and 5; RFA Sections 3 and 5.
<ul style="list-style-type: none"> ■ Cost-effectiveness of alternative remedial action measures. 	<ul style="list-style-type: none"> ■ For IRP-2 and IRP-9, Engineering Evaluation/Cost Analysis, Section V, 1997; and for MWA-03, Engineering Evaluation/Cost Analysis, Section V, 1997.
<ul style="list-style-type: none"> ■ The potential environmental impacts of alternative remedial action measures, including but not limited to, land disposal of the untreated hazardous substances as opposed to treatment of the hazardous substances to remove or reduce their volume, toxicity, or mobility prior to disposal. 	<ul style="list-style-type: none"> ■ For IRP-2 and IRP-9, Engineering Evaluation/Cost Analysis, Section V, 1997; and for MWA-03, Engineering Evaluation/Cost Analysis, Section V, 1997.

For Additional Information

The Marine Corps/Navy encourages community involvement in the decision-making process of the environmental restoration program at MCAF Tustin. If you have any questions or concerns about environmental activities at MCAF Tustin, please feel free to contact any of the following project representatives:

Mr. Keith Forman

BRAC Environmental
Coordinator

Base Realignment and Closure
Attn: Keith Forman, MCAF Tustin
P.O. Box 51718
Irvine, CA 92619-1718
(949) 653-7317
(619) 532-4812

Mr. Andrew Bain

Community Involvement
Coordinator

Superfund Division,
U.S. EPA
Office of Hazardous Waste
75 Hawthorne St. (SFD-3)
San Francisco, CA 94105
(800) 231-3075

Ms. Sharon Fair

Federal Programs Supervisor

Cal-EPA, Dept. of Toxic Substances
Control
5796 Corporate Avenue
Cypress, CA 90630
(714) 484-5416

MCAF Tustin Restoration Advisory Board

The community-based MCAF Tustin Restoration Advisory Board (RAB), which is made up of representatives from local agencies and members of the public, meets bimonthly with Marine Corps/Navy representatives to discuss environmental issues at MCAF Tustin. The RAB has reviewed and commented on the Remedial Investigation Report for Operable Units 1 and 2, the Expanded Site Inspection Report, and the RCRA Facility Assessment (RFA) Report. These documents form the basis for the Proposed Plan/Draft Remedial Action Plan. If you are interested in becoming a member of the RAB, please complete the mailing coupon on page 15.

Investigation Reports and Risk Assessment Results Available for Review and Comment

The collection of reports and historical documents used by the Marine Corps/Navy in the selection of cleanup or environmental management alternatives is the Administrative Record (AR). The AR file provides a record of decisions and actions taken by the Marine Corps/Navy for the three IRP sites and nine AOCs discussed in this Proposed Plan/Draft Final Remedial Action Plan. It includes the Final Remedial Investigation Report for Operable Units 1 and 2; the Final Expanded Site Inspection Report; the Final RCRA Facility Assessment Report; the Final PAH Apron Study; Non-Time-Critical Removal Action Memorandum/Removal Action Work Plan for IRP-2 and IRP-9; Addendum to the Non-Time-Critical Removal Action Memorandum/Removal Action Work Plan for IRP-2 and IRP-9; the Closure Report-Soil Removal Actions at Sites IRP-2 and IRP-9; No Further Action Report, Closure of AOC MWA-03; and the U.S. EPA's guidance for conducting risk assessments and selecting no further action alternatives.

Administrative Record File Location:

The complete AR file and a site-specific index for the no further action sites and AOCs is available for public review and comment at MCAF Tustin from January 2 through January 31, 2000. To arrange a time to review documents during the comment period, contact the MCAF Tustin BRAC Environmental Coordinator, Mr. Keith Forman at (949) 653-7317 or (619) 532-4812.

Information Repository Location:

Community members can also find key supporting documents that pertain to these IRP sites and AOCs, and a complete index of all MCAF Tustin Administrative Record documents, at the Information Repository at the University of California at Irvine Main Library, Government Publications Department. The telephone number is (949) 824-7362 or (949) 824-6836.

Internet Connection

For more information on the closure of MCAF Tustin and the Installation Restoration Program, check out the Southwest Division Naval Facilities Engineering Command Website at:



www.efdswn.navy.mil/pages/envrnmntl.htm

Here you will find base closure information on MCAF Tustin, as well as links to related websites.

The Next Step

Public comments on this Proposed Plan/Draft Final Remedial Action Plan received during the period of January 2 to January 31, 2000 will be considered in the final environmental determination for the IRP sites and AOCs. Responses to comments will be addressed in a Responsiveness Summary. The Responsiveness Summary will be part

of the Record of Decision/Final Remedial Action Plan, which will formally document the specific environmental determination for sites IRP-2, IRP-9, IRP-13E, and AOCs AD-04, AS-06, AS-08, AST-02, AST-04, MDA-04, MDA-07, MMS-01, and MWA-03. For more information on opportunities to comment on this Proposed Plan/Draft Remedial Action Plan see page 1.

Installation Restoration Program



MAILING LIST COUPON

If you would like to be on the mailing list to receive information about environmental restoration activities at MCAF Tustin, please complete this coupon and mail to: Commanding Officer, Base Realignment and Closure, Attn: Keith Forman, BRAC Environmental Coordinator, MCAF Tustin, P.O. Box 1718, Irvine, CA 92619-1718

- Add me to the MCAF Tustin Installation Restoration Program mailing list.
- Send me information on Restoration Advisory Board membership.

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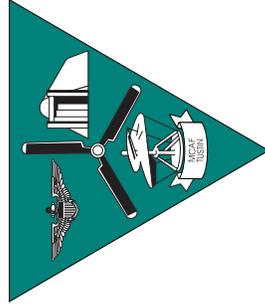
Affiliation (optional) _____ Telephone _____

See Inside . . .

Proposed Plan/Draft Remedial Action Plan

*No Further Action Recommended for
Three Installation Restoration Program Sites
and Nine Areas of Concern*

Marine Corps Air Facility Tustin



Commanding Officer
Base Realignment and Closure
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