

SECTION 1

Introduction

This Closure Report was prepared by CH2M HILL for the U.S. Army under contract to the U.S. Army Corps of Engineers (USACE), Sacramento District (contract number DACW05-99-0021). This Closure Report was prepared to address all the petroleum storage and handling facilities associated with the former tank farm area located on the Petroleum, Oil, and Lubricant (POL) Hill Outparcel at the former Hamilton Army Air Field (HAAF), Novato, California (Figures 1-1 and 1-2). The former tank farm area incorporates, for the purpose of this Closure Report, all facilities (except as noted below) at the POL Hill Outparcel including former below- and above ground tanks, vaults, pipes, pumps, and buildings. The former tank farm area does not include the former above-ground storage tank (AST-2) area located on Reservoir Hill, which is being addressed separately in a Corrective Action Plan (CAP) and is not further discussed in this Closure Report. This report provides the results and interpretations to support and recommend the closure of the former tank farm at the POL Hill Outparcel (Figure 1-3).

1.1 Purpose and Objectives

The purpose of this Closure Report is to document and summarize the results of historical investigations of the former tank farm located on the POL Hill Outparcel and to provide sufficient detail to demonstrate and recommend closure of these site features.

This report provides information on the site's environmental setting, previous land use, and the nature and extent of historic contaminant impacts. The results for soil and groundwater media are presented from previous site investigations and compared to applicable residential cleanup goals (RCGs). These comparisons are used to support the recommendation for closure of this area.

1.2 Problem Statement

The Army and the Air Force used the POL Hill Outparcel to store fuel from 1942 to 1986. Historically, 20 25,000-gallon underground storage tanks (USTs), 1 750-gallon UST, and 3 ASTs were located in the former tank farm area. Operation of the former tank farm resulted in documented impacts to soil and groundwater. Environmental investigations have determined that JP-4 jet fuel was the primary soil contaminant. There were also indications of minor releases of diesel fuel and waste oil. The data do not indicate that a release of leaded fuels occurred (International Technology Corporation [IT] 1999; IT 1997b). The only potential chemical of concern that was present at the site at levels above the Residential Cleanup Goals (RCGs) was total petroleum hydrocarbons. The soils containing TPH levels above 100 mg/kg were removed. The process of soil removal has also addressed shallow groundwater contamination previously observed in early investigations of the former tank farm.

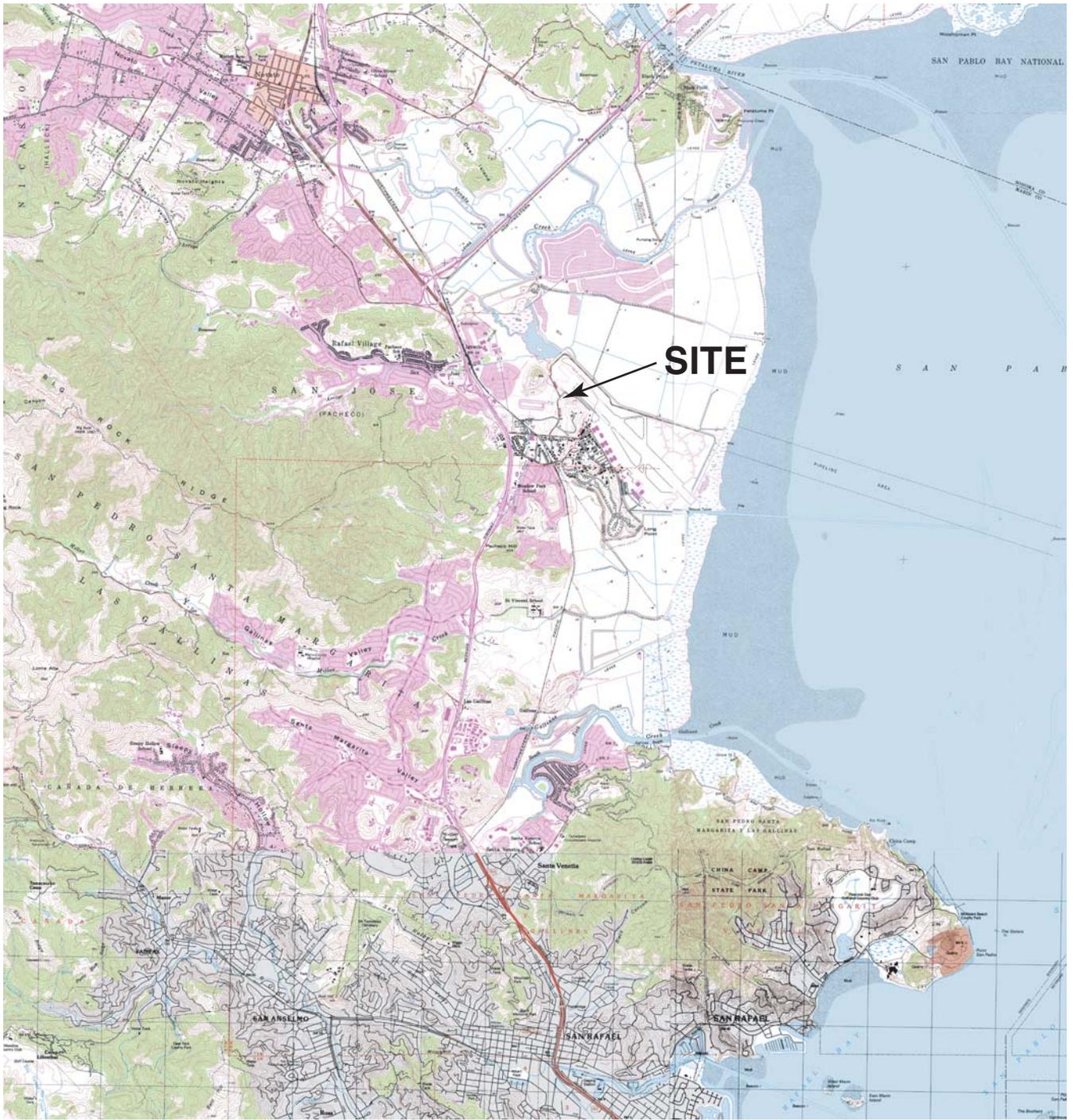
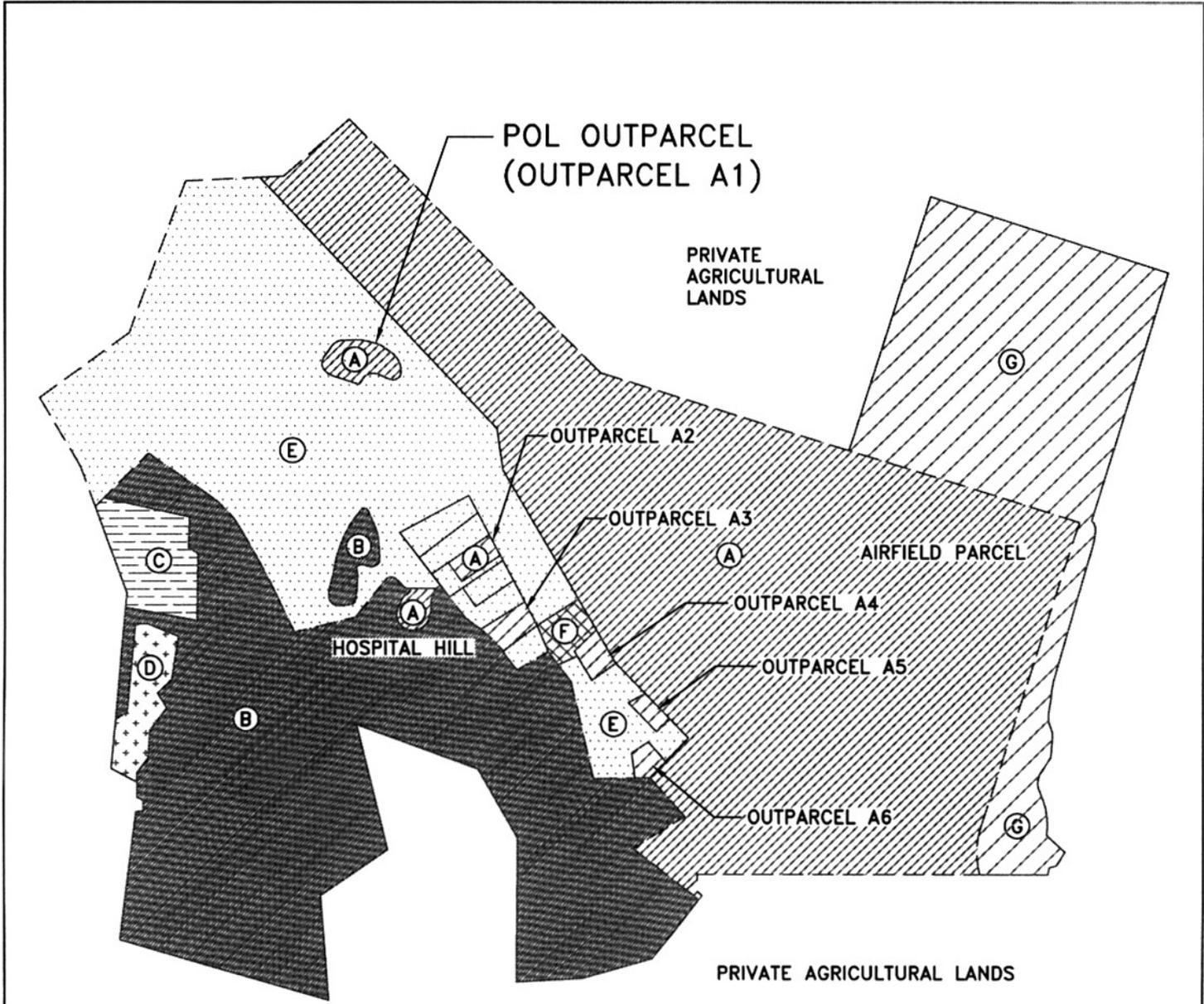


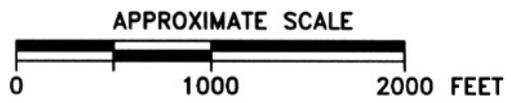
Figure 1-1
Site Location Map
 POL Hill
 Hamilton Army Airfield
 Novato, California

Source: USGS Novato, Petaluma Point, San Rafael,
 and San Quentin Quadrangles - July 1983



LEGEND:

- ARMY-OWNED PROPERTY BOUNDARY
- (A) [Diagonal Hatching] BRAC PROPERTY
- (B) [Dark Cross-Hatching] NAVY HOUSING
- (C) [Horizontal Hatching] LANHAM HOUSING
- (D) [Star Pattern] NOVATO SCHOOL DISTRICT
- (E) [Dotted Pattern] GSA SALE PARCEL
- (F) [Cross-Hatching] US COAST GUARD
- (G) [Diagonal Hatching] STATE OF CALIFORNIA



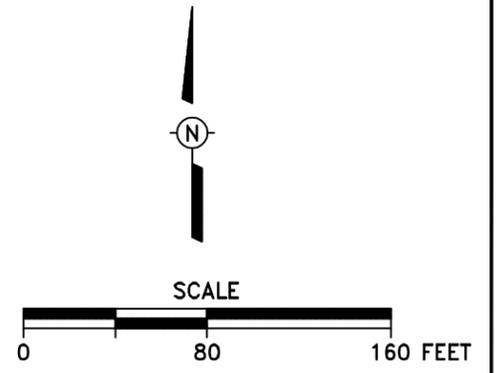
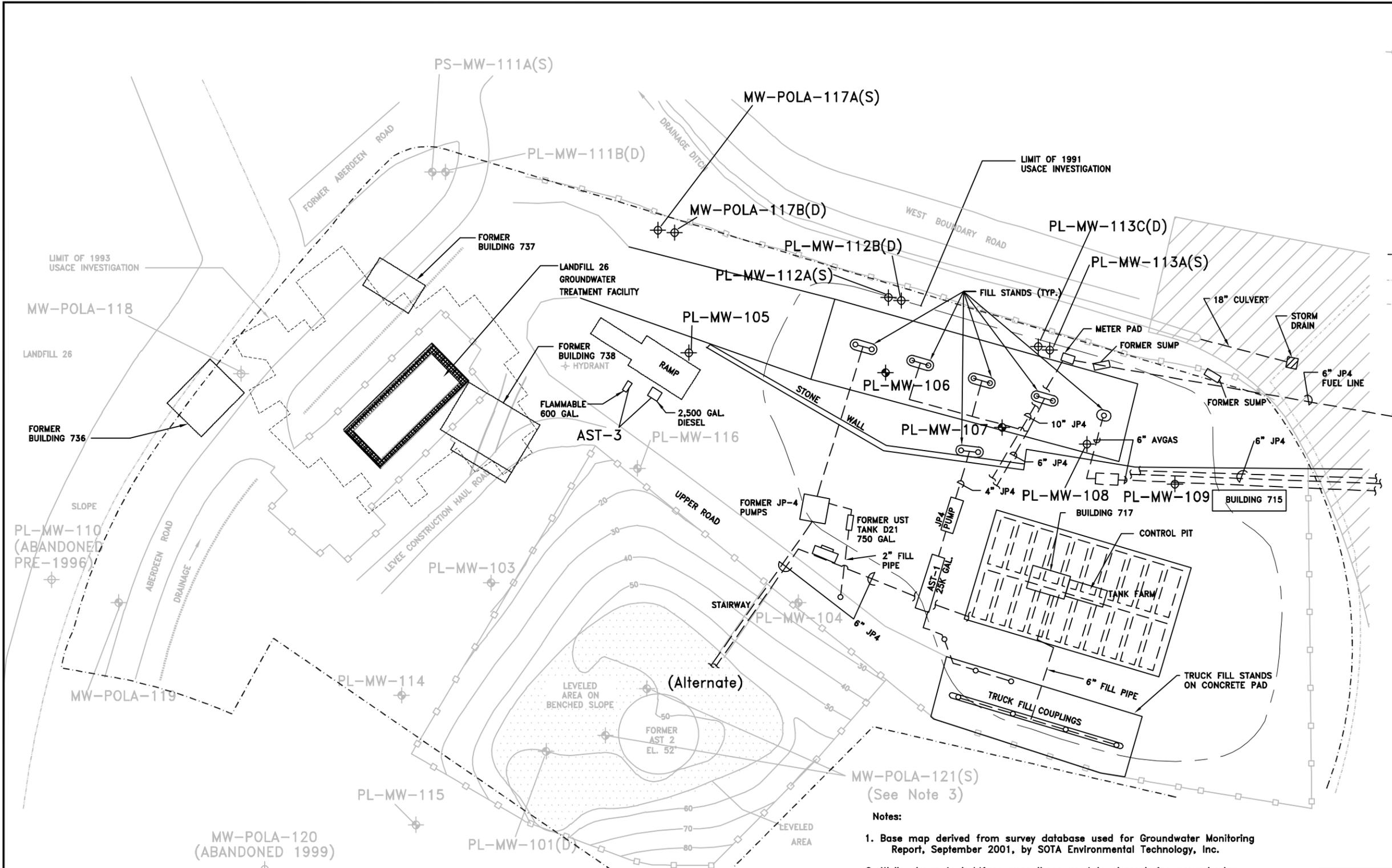
<p>BRAC PROPERTY LOCATION MAP POL HILL HAMILTON ARMY AIRFIELD NOVATO, CALIFORNIA</p>	
<p>CH2MHILL</p>	<p>FIGURE 1-2</p>
<p>159892.08.PL.CR</p>	
<p>April 2003</p>	

SOURCES:
 Woodward-Clyde Federal Services Drawing SK9469
 International Technology Corporation Drawing 762538-A315

LEGEND:

- FENCE
- ◆ EXISTING MONITORING WELL
- ⊕ ABANDONED MONITORING WELL
- (S) SHALLOW MONITORING WELL
- (D) DEEPER MONITORING WELL
- ▭ FORMER STRUCTURES
- ▭ APPROXIMATE LIMITS OF USACE EXCAVATION
- ▨ NHP LEVEE AND EASEMENT
- - - - - POL OUTPARCEL BRAC PROPERTY BOUNDARY
- - - - - GSA PHASE 1 TRANSFERRED PROPERTY BOUNDARY
- - - - - LANDFILL 26 BOUNDARY

Well ID	Northing	Easting
PL-MW-101	38.063567	122.521017
PL-MW-103	38.063916	122.521169
PL-MW-104	38.063886	122.520355
PL-MW-106	38.064369	122.520136
PL-MW-107	38.064261	122.519828
PL-MW-114	38.063675	122.521403
PL-MW-115	38.063408	122.521358
PL-MW-116	38.064161	122.520786
MW-POLA-121	38.063603	122.520856
Tank Farm Center	38.06394	122.51939



- Reference Notes:**
- Atlas Hydraulic Corporation and IT Corporation for US Army Corps of Engineers, Sacramento District Underground Storage Tank Permanent Closure Report Storage Tank Removal Project, Tank Numbers D01 through D21, Plan Location 3. Hamilton Army Airfield, Navato, California. November 7, 1986 Figures 1 through 6 and report text.
 - Weston for USATHAMA, US Army Toxic and Hazardous Materials Agency Task Order 2, Preliminary Assessment Report, Hamilton Army Airfield, Navato, California. January 1990 Figure ES-1, photographs 5 & 6, and Chapter 3 text.
 - EC Jordan Co. for USATHAMA and US Army Corps of Engineers Final Technical Plan, Data Item A005, Hamilton Army Airfield, Navato, California. November 1990 Figure 4-3 and Chapter 4 text.

- Notes:**
- Base map derived from survey database used for Groundwater Monitoring Report, September 2001, by SOTA Environmental Technology, Inc.
 - Wells shown in boldface were those used to characterize groundwater conditions in the Former Tank Farm area of the POL Hill Outparcel.
 - Alternate location for MW-POLA-121(S) as shown on Figures 2-1 through 2-4 was taken from IT, 1999 Closure Report. The alternate location is incorrect and the actual location is due west of the former tank.
 - Abandoned monitoring wells were closed in October 2002 unless alternate date is indicated in parentheses. Well abandonment information taken from Table 1: Monitoring Well Summary for HAAF contained within IT Corporation (2001) Work Plan, Monitoring Well Abandonment, Hamilton Army Airfield, Navato, CA., Revision 1, December. This table was revised for the Army just before the well destruction occurred in October 2002.

SITE LOCATION MAP
POL HILL OUTPARCEL
HAMILTON ARMY AIRFIELD

CH2MHILL

FIGURE 1-3
159892.08.PL.CR
APRIL 2003

The entire POL Hill Outparcel is slated for transfer to the City of Novato, California. This Closure Report for the former tank farm along with the Corrective Action Plan for the former AST-2 area (under separate cover) are intended to support the property transfer of the POL Hill Outparcel to the City of Novato. The intended reuse of the entire POL Hill Outparcel by the City will be for recreational open space.

1.3 Regulatory Authority

The U.S. Army is the lead agency involved in the BRAC Closure process at HAAF (USACE 1991). The California Regional Water Quality Control Board (RWQCB) is the lead regulatory agency for the POL Hill Outparcel. This was formally documented in a letter from the California Department of Toxic Substances Control (DTSC) to the Army because petroleum hydrocarbons are not regulated as hazardous substances in the California Health and Safety Code (DTSC 1998). In addition, the U.S. Environmental Protection Agency (USEPA) is an oversight agency for closure of the POL Hill Outparcel.

Remediation activities described in this report were performed pursuant to the Comprehensive Remedial Investigation/Feasibility Study Work Plan (IT 1997a) and the Contractor Quality Control/Sampling and Analysis Plan (CQC/SAP) (IT 1997b), which were approved by the regulatory agencies. Additionally, the remedial investigation activities were consistent with the statutory requirements defined in the California Code of Regulations Title 23, Division 3, Chapter 16, Article 11 (Underground Storage Tanks) (1994).

Other guidance documents used in preparation of this Closure Report include the Tri-Regional Board Staff Recommendations for Preliminary Evaluation and Investigation of Underground Storage Tank Sites (TRWQCB 1990), the Supplemental Instructions to State Water Board, December 8, 1995, Interim Guidance on Required Cleanup at Low Risk Fuel Sites (RWQCB 1996), and the risk-based corrective action approach documented in the American Society of Testing and Materials (ASTM) Standard Guide for Risk Based Corrective Action Applied at Petroleum Release Sites (1995) San Francisco Bay Basin (Region 2) Water Quality Control Plan (RWQCB 1995).

1.4 Closure Criteria

The general requirements necessary to demonstrate closure are:

- Fuel leaks were stopped and ongoing sources have been removed or remediated.
- The site was adequately characterized.
- Little or no groundwater impacts exist.
- No water wells, deeper drinking water aquifers, surface water, or other sensitive receptors are likely to be impacted.
- The site presents no significant risk to human health.

These issues are addressed in Sections 3 and 4 of this report and are summarized here.

The closure criteria for the POL Hill Outparcel were agreed upon by regulators and Army officials after a majority of the investigations performed at this site were completed. Cleanup criteria for the former tank farm are based on criteria developed for the POL Hill Outparcel.

The POL Hill Outparcel is located adjacent to the neighboring General Services Administration (GSA) Phase I Sale Area. The reuse of the GSA property is residential. The proposed future reuse of the POL Hill Outparcel is recreational. Since the proposed future use of the Outparcel is recreational open space, it presents a lower exposure to future human receptors than the residential land use exposure scenarios upon which the RCGs were originally based. For this reason, the cleanup criteria developed for the GSA Phase I Sale Area are more conservative when they are applied to the POL Hill Outparcel.

The RCG development process involved identifying a range of concentrations that could be used as cleanup goals. For soils, these cleanup goals included unit risk concentrations (URCs) representing a chemical concentration that will produce an excess cancer risk of one in a million (10^{-6}) and a hazard quotient equal to or greater than 1, background concentrations, and practical quantitation limits (PQLs). For groundwater, the list of potential goals included URCs, PQLs, and levels protective of aquatic receptors.

Once the range of concentrations was compiled for each medium, selection of cleanup goals for a residential receptor was based on the most stringent goal for each medium (soil and groundwater). Since the exposure for a recreational user is typically less than that for a residential receptor, using RCGs is conservative. The final cleanup goals established for this site are 200 ppm (TPH measured as diesel) for soil, 1,200 $\mu\text{g}/\text{L}$ (TPH measured as JP-4¹), and 600 $\mu\text{g}/\text{L}$ (TPH measured as gasoline) for groundwater.

It should be noted that, before establishing the final cleanup goal of 200 ppm TPH in soil, several interim levels of TPH concentrations in soil were used between 1986 and 1996 to guide investigation and remediation activities at this site. A level of 1,000 ppm TPH in soil was used to guide initial activities between 1986 and 1987, and a level of 100 ppm of TPH in soil was used to guide excavation activities between 1990 and 1996.

1.5 Summary

The results of historical investigations and remedial actions at the former below-ground tank farm show:

- Sources of contamination (i.e., above- and below-ground fuel storage tanks, pumps, pipelines, and buildings) have been removed.
- Investigations conducted between 1985 and 1996 adequately characterize the site.
- To the extent physically possible, all soil with TPH concentrations above 100 ppm have been removed.
- Soil excavation activities in the former tank farm area have addressed groundwater contamination observed in initial investigations.
- Risk evaluations indicate there is no threat to human health or the environment.

¹ Because no numerical value existed for TPH measured as JP-4, the cleanup goal for TPH measured as diesel was used.

1.6 Data Comparability

Environmental investigations at the former tank farm have included both nonspecific TPH analyses that use infrared spectroscopy (IR), and partially specific TPH analysis methods that use gas chromatography (GC). IR methods are subject to interference from naturally occurring organic matter (i.e., Bay Muds). EPA Method 418.1 (EPA 1995) is an IR method that was used at HAAF during previous investigations to quantify total recoverable petroleum hydrocarbons (TRPH). Because of the problems with interferences, there is an uncertainty for using the TRPH data as an indicator of “true” hydrocarbon contamination. For this reason, TRPH data will not be used or referenced in this document.

GC methods (modified EPA Method 8015) can be used to distinguish between naturally occurring hydrocarbons and refined petroleum hydrocarbon products or contaminants. Two versions of modified EPA Method 8015, purgeable and extractable TPH fractions, have been used to analyze samples collected at HAAF. In this document, GC results are reported as specific TPH fractions (i.e., TPH measured as diesel, TPH measured as JP-4, TPH measured as motor oil, and TPH measured as gasoline). The Storage Tank Removal Report (Atlas, 1987) describes the project's need to measure volatile hydrocarbons, semi-volatile, and non-volatile hydrocarbons in order to characterize the complex fuel mixtures at the site, such as JP4. To accomplish this, two separate analytical methods were employed: a purge and trap/GC/FID and PID method was used to measure volatile hydrocarbons; and a liquid extraction with direct injection/capillary column GC/FID method was used for semi-volatile (kerosene and diesel) and non-volatile (lubricating oil) hydrocarbons. Based on this information, the Volatile Fuel Hydrocarbon (VFH) term is interpreted to mean purgeable TPH.

Although speciation of gasoline, diesel, and JP-4 is possible analytically, end users of the data must recognize that chemical interferences and degradation phenomena will influence quantities reported for each species. For example, higher levels of heavier petroleum products such as diesel, JP-4, or waste oils may contain some volatile components that produce a response when measuring TPH as gasoline. Similarly, the heavy ends of gasoline and JP-4 chains may also produce a response when measuring TPH as diesel. Furthermore, petroleum constituents may undergo varying degrees of weathering and degradation during the period between release and sample collection. Consequently, chromatogram signatures from investigative samples often do not match those associated with calibration standards. When the sample chromatogram does not match that of the fuel standard used for calibration, the contaminant is reported by the laboratory as “unknown hydrocarbon.” When the unknown falls in the gasoline range (i.e., number of carbons in base chain) (C_7 to C_{12}), the result will be quantitated against the gasoline standard. When the unknown falls in the diesel (C_{10} to C_{24}), JP-4 (C_8 to C_{13}), or motor oil (C_{24} to C_{36}) range, the result will be quantitated against the diesel standard.

Given data limitations associated with historic methods (i.e., EPA Method 418.1) and speciation uncertainties, this report presents the type and likely range of contaminant levels derived from correlating the investigative results with process knowledge. For example, soil and groundwater contamination attributed to releases from the former tank farm will be evaluated as JP-4 (see Section 2.1) even though contaminant concentrations may have been reported as TRPH or gasoline/diesel.