

INSTALLATION RESTORATION PROGRAM

Decision Document for Soil at the Base Collection Pond, Site 5

144TH FIGHTER WING
CALIFORNIA AIR NATIONAL GUARD
FRESNO AIR TERMINAL, FRESNO, CALIFORNIA

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**Draft Decision Document
for Soil at the Base Collection Pond, Site 5
144th Fighter Wing, California Air National Guard
Fresno Air Terminal
Fresno, California**

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**U.S. Department of Energy
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January 1996

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1.0 Introduction

This decision document (DD) for Site 5, the Base collection pond (BCP) at the California Air National Guard (ANG) Base, Fresno, California is being submitted under the requirements of the U.S. Department of Defense Installation Restoration Program (IRP) and the Comprehensive Environmental Response, Compensation, and Liability Act, as amended by Superfund Amendments and Reauthorization Act.

1.1 Purpose

The objective of this DD is to provide a detailed technical rationale to support no further action for soil. Implementation of this recommended alternative would preclude any future remedial investigation (RI)/feasibility study activities for soil at the site. Figure 1 shows the site location.

This document summarizes the results from previous investigations which concluded that soil at Site 5 does not pose a significant threat to public health or the surrounding environment based on the type and concentration of contaminants, sources, pathways, and contaminant receptors. In addition, the BCP has been decommissioned by cutting off all drainage inlets, rerouting all surface drainage to the City Collection Pond (immediately west of the Base), filling the BCP with soil to grade, and constructing an asphalt road to run along side the BCP. Clearance for the construction was granted by the State of California based on the results of previous investigations. This DD provides the rationale and supporting information upon which the clearance was based.

Groundwater beneath and in the vicinity of Site 5 contains both regional contamination, associated with a site hydraulically upgradient of the Base (trichloroethene [TCE]), and contamination associated with the BCP (tetrachloroethene [PCE]). The PCE groundwater plume, which is suspected to have originated from the BCP, impacts groundwater that is already contaminated with TCE. Since PCE is present only where TCE is also found, the most feasible and effective groundwater cleanup strategy may be to address the matter as a whole rather than source by source, and to establish points of compliance that encompass the entire plume. A no-further-action recommendation for groundwater at Site 5 is neither justified nor technically appropriate at present.

The summary information presented herein can be found in its entirety in the Interim Report of Findings, Focused Remedial Investigation (IT Corporation [IT], 1993a), Quarterly

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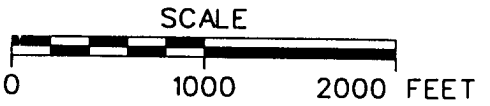
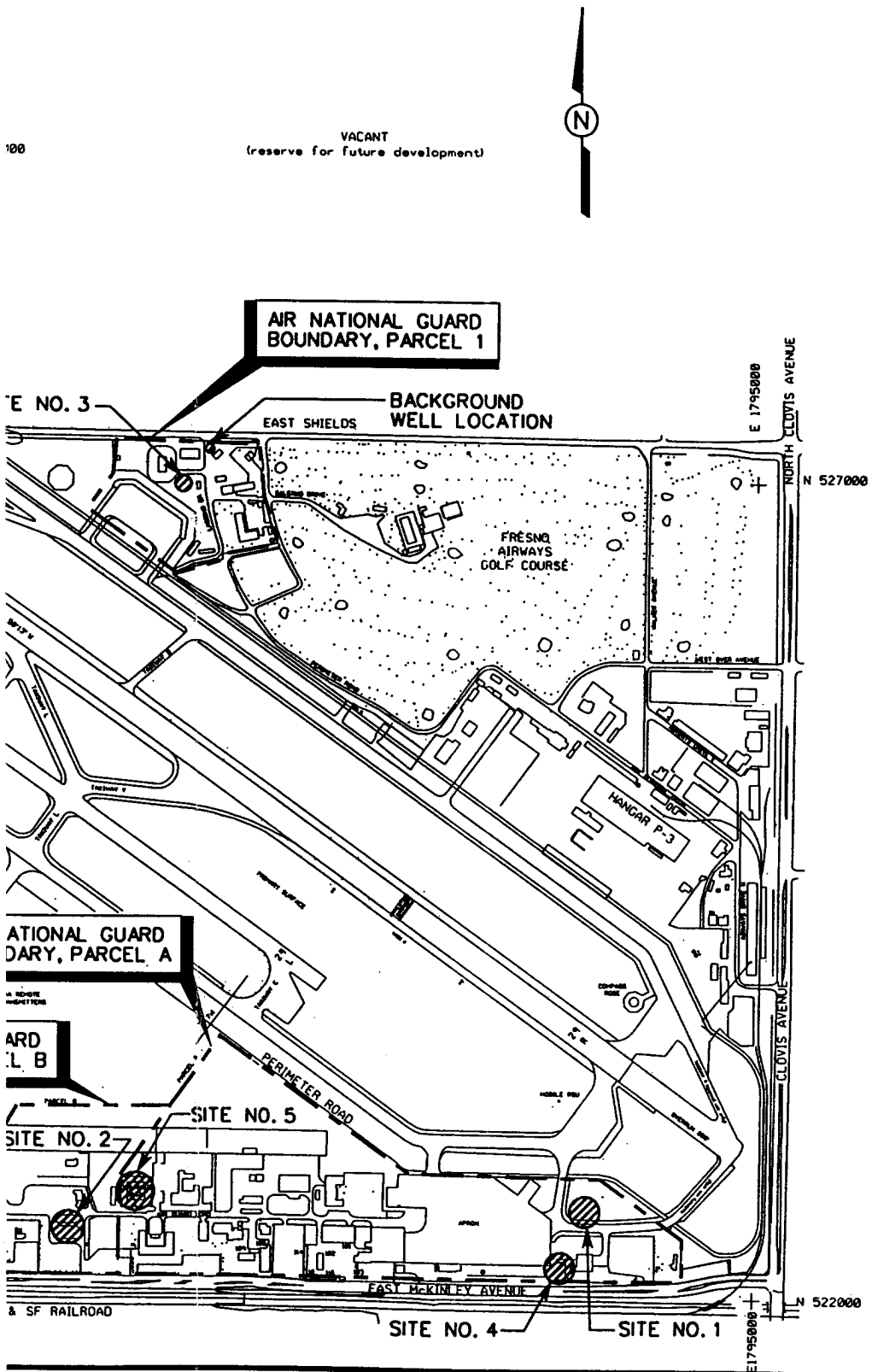


FIGURE 1
BASE MAP LOCATION OF IDENTIFIED INVESTIGATION SITES

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FRESNO, CALIFORNIA



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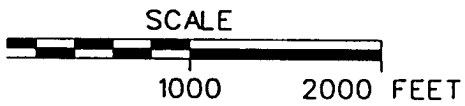


FIGURE 1
BASE MAP LOCATION OF
IDENTIFIED INVESTIGATION SITES

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RESNO, CALIFORNIA

Groundwater Report, April 1993 (IT, 1993b), and RI Report (IT, 1996). Results of previous investigations substantiate the construction activities as the removal of the probable PCE source, and support that soil at Site 5 be eliminated from further IRP-related activities.

1.2 Location

The California ANG leases approximately 140 acres of land from the City of Fresno on three different parcels inside the Fresno Air Terminal (FAT) boundaries. Site 5 is within the main parcel in the southeastern section of the FAT, as shown in Figure 1.

1.3 Environmental Setting

To understand the rationale for the no further action decision at Site 5, the following discussion describes the environmental setting and possible migration potential in the vicinity of this site.

1.3.1 Climate

The climate is characterized by hot, dry summers and cool, moist winters. Mean monthly temperatures range from 46 degrees Fahrenheit (°F) in December to 85°F in July. Winds are generally from the northwest. The average annual precipitation is less than 10 inches in the Fresno area. More than 90 percent of the yearly precipitation occurs between October and April. Yearly rainfall varies widely from year to year and shows long-term wet and dry periods. The mean evaporation rate is 66 inches per year.

1.3.2 Geology

Fresno is situated in the Central Valley province of California. The valley is a large, elongated, northwest trending, asymmetric structural trough that is bounded on the east by the Sierra Nevada and on the west by the Coast Ranges. Fresno is located in the eastern San Joaquin valley on sedimentary deposits characterized by a mixture of poorly sorted clay, silt, sands, and gravels with some beds of claystone, siltstone, sandstone, and conglomerate of Quaternary and Pliocene ages. The unconsolidated deposits generally extend to depths of 1,000 feet or more.

At the Base, the geology is characterized by alluvial fan deposits (Cehrs, et al., 1979). The fans have a low surface relief with very gentle gradients. Deposits in these fans are associated with an alluvial flood plain regime. Sediments in the fans range from clays to gravel, with finer sediments (silts and clays) associated with overbank and flood plain

deposits, and coarser sediments (sands and gravels) associated with levee, crevasse splay, channel lag, and point bar deposits.

Alluvial fan deposits are heterogeneous both vertically and laterally. Alluvial fans proximal to the site exhibit a wide variety of depositional processes. The alluvial deposits are variable both laterally and vertically with multiple source areas from shifting streams that transport, distribute, and deposit sediments (Cehrs, et al., 1979). Therefore, beds beneath the general site are very localized in extent.

1.3.3 Hydrogeology

In the Fresno area, all municipal and rural domestic water is pumped from the alluvial aquifers. The aquifer system has been described as unconfined or semiconfined depending on local hydrogeologic conditions (Cehrs, et al., 1979; Steele, 1986). At the Base, the water table is approximately 80 feet below ground surface and flows from the northeast towards the southwest (IT, 1993b; IT, 1996).

Groundwater flow, through the alluvial sediments comprising the aquifer system beneath the Fresno area, is controlled by the slope of the water table (to the southwest) and the occurrence of coarse-grained sediments within the alluvial fans. Coarse-grained sediments within fan deposits generally occur in northeast-southwest trending elongated sand bodies resulting from deposition in ephemeral stream channels that have shifted through time (Cehrs, et al., 1979). Thus, in the Fresno area groundwater flows generally to the southwest and preferentially through coarse-grained channel deposits.

2.0 Background

2.1 Site History

In April 1988, a Preliminary Assessment was completed by the Hazardous Material Technical Center (HMTC) focusing on past and present generation, use, handling, and disposal practices of hazardous waste and materials. Four sites were investigated based on the HMTC's findings. As the result of supplemental data collected during this site investigation (SI), Site 5, the BCP, was identified as being a source of possible groundwater contamination (IT, 1992), and it was added to the IRP.

The BCP was a collection sump that periodically received washdown waters and storm runoff from drain gutters across the western portion of the Base. In addition, the pond received runoff from a portion of McKinley Avenue which runs parallel to the southern Base property boundary. Water was allowed to percolate through the soil at the pond to the regional water table. Infiltration was aided by five vertical gravel wells that were installed in the bottom of the pond in the early 1970s. These wells, however, eventually silted up over time, and their ability to transmit water diminished.

The BCP covered an area of approximately 19,600 square feet, and had steep sloping sides (1.5 to 1 ratio) down to the bottom which is approximately 12 feet below ground surface (bgs). In February 1995, the State of California approved a request to construct at Site 5. Approval was based on the findings from investigations which indicate that soils at Site 5 do not pose a threat to human health or the environment, and are not a continuing source for contamination to underlying groundwater. The BCP has been filled with soil to grade. Therefore, Site 5 no longer exists as it did during the site investigation and focused remedial investigation. The BCP will be capped with concrete and/or asphalt by the year 2006.

2.2 Investigation Results

The SI was conducted in 1990 as a programmatic, sequential step of the Air National Guard Readiness Center's (ANGRC) IRP because of the potential for contamination and migration of the suspected contaminants in the soils and/or groundwater at the sites. The first investigation at Site 5 was preliminary in nature and involved surface soil sampling during the SI to determine the nature of contaminants. The second investigation was a remedial investigation focused specifically on Site 5 to assess the potential contribution by the Base to regional groundwater contamination by chlorinated solvents. The third investigation was a deep

aquifer investigation performed to characterize the vertical extent of groundwater contamination beneath the Base. Groundwater sampling results from the focused RI and deep aquifer investigation will only be discussed here as they pertain to decisions regarding soil contamination.

2.2.1 Site Investigation Results

Based on a review of Base construction diagrams, it was determined that drainage pipes, which emptied into the BCP, collect water from the building areas north of the main Base road, which includes the Civil Engineering, Avionics Shop, and Base Operations buildings. Due to the possibility of trace constituents in the wastewater runoff to the pond, a set of surface and shallow soil samples were collected at the end of the SI to see if this area might be a source of contamination infiltrating to soils and possibly migrating to groundwater. Four separate locations in the bottom of the basin were sampled at the ground surface and 2.5 to 3 feet bgs (IT, 1992). Eight original samples and one field duplicate sample were collected and analyzed for total petroleum hydrocarbons (TPH) - as diesel, volatile organic compounds (VOC), semivolatiles, pesticides/polychlorinated biphenyls (PCB), total organic lead, and toxicity characteristic leaching procedure metals.

Soil Sampling Results. No VOCs, pesticides, or PCBs were reported in any of the shallow soil samples. Of the nine samples collected, four reported levels of semivolatile compounds, such as fluoranthene, pyrene, bis(2-ethylhexyl)phthalate, and chrysene. All of the concentrations for these compounds were estimated concentrations below the quantitation limits (J-qualified). The usual quantitation limit for all of these compounds in a relatively clean soil sample is 330 micrograms per kilogram ($\mu\text{g}/\text{kg}$).

Two samples reported detectable levels of TPH at concentrations of 28 and 20 milligrams per kilogram. Both of these quantities were qualified as estimated due to the analytical gas chromatograph (GC) analyte curves not exactly matching a singular hydrocarbon representation.

Inorganic analytical results did not show any concentrations for further concern.

Groundwater Samples Results. Direct investigation of groundwater at Site 5 was not conducted as part of the SI. However, results from two rounds of groundwater sampling during the SI showed that TCE groundwater contamination was migrating onto Base property from an upgradient source, but that PCE appeared to be originating from beneath the Base.

The most likely source area identified by the Base and ANGRC was the BCP. Thus, Site 5 was added to the IRP, and more rigorous investigations were conducted.

2.2.2 Focused Remedial Investigation Results

From the results of the groundwater investigation during the SI, a limited-scope, focused RI at Site 5 was designed to assess the potential contribution by the Base to regional groundwater contamination. The focused RI was also to determine if Site 5 was a potential source area for PCE groundwater contamination, and, if so, to characterize the lateral and vertical extent of soil contamination.

Soil conditions in and around the BCP were characterized during the focused RI by conducting a soil organic vapor (SOV) survey, drilling and sampling soil borings, performed a field laboratory screening analysis on soil samples and installing and sampling monitoring wells upgradient and downgradient of the BCP.

2.2.2.1 Soil Organic Vapor Survey Results

A SOV survey was conducted across the western portion of the Base and in the immediate area surrounding Site 5 to identify a potential source of known PCE contamination in the groundwater. Fifty locations were sampled and a total of 83 SOV samples were collected at depths both above and below the hardpan. Samples were analyzed on site for VOCs.

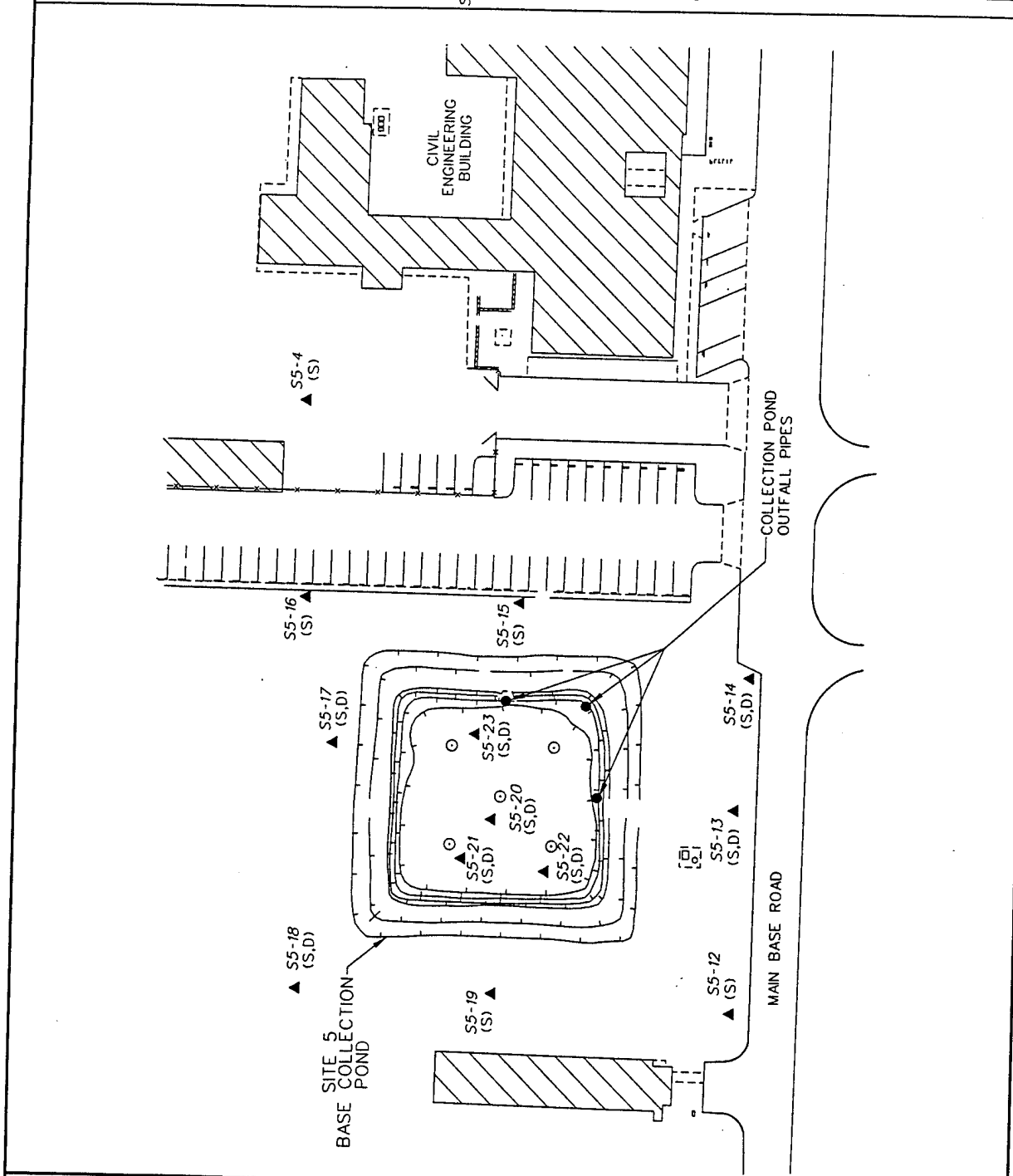
SOV samples collected above the hardpan ranged in depth from 3 to 8 feet bgs; SOV samples from below the hardpan were collected from depths of 15 to 21 feet bgs. Samples were collected around the BCP, within Site 5, west, southwest, and northwest of the petroleum, oil, and lubricant facility, and in the north perimeter field. SOV sampling locations in and around the BCP, with their relative depth ranges, are shown in Figure 2.

No positive detections were reported for any shallow or deep SOV samples collected across the western portion of the Base or within the BCP.

2.2.2.2 Results of Soil Screening Samples

Twelve soil borings were drilled and sampled to the water table during the focused RI activities, at the locations shown in Figure 3. Five borings (SB5-03 through SB5-07) were located in the bottom of the BCP and extended to a depth of 65 feet below ground surface (bgs) where groundwater was encountered. Five other borings (SB5-01, SB5-02, SB5-08, SB5-09, and SB5-11) were located along the top edge of the BCP and sampled to a total

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|---------------------------------------|-------------------------|---------------------------|-------------------------|
| 40924ES.050 10:31:13 Jan 15, 1996 KJ8 | STARTING DATE: 07/26/95 | DATE LAST REV: | DRAWN BY: PJONES |
| | INITIATOR: S. LOGAN | DRAFT. CHK. BY: C. TUMLIN | ENGR. CHK. BY: S. LOGAN |
| | PROJECT MGR.: D. BURTON | | |
| | DWG. NO.: 40924ES.050 | | |



LEGEND:

- DRY WELL LOCATION (APPROX.)
- ▲ SOV SAMPLING POINT
- (S) SHALLOW SAMPLE COLLECTED BETWEEN 3 AND 8 FEET
- (D) DEEP SAMPLE COLLECTED BETWEEN 15 AND 21 FEET

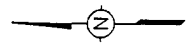
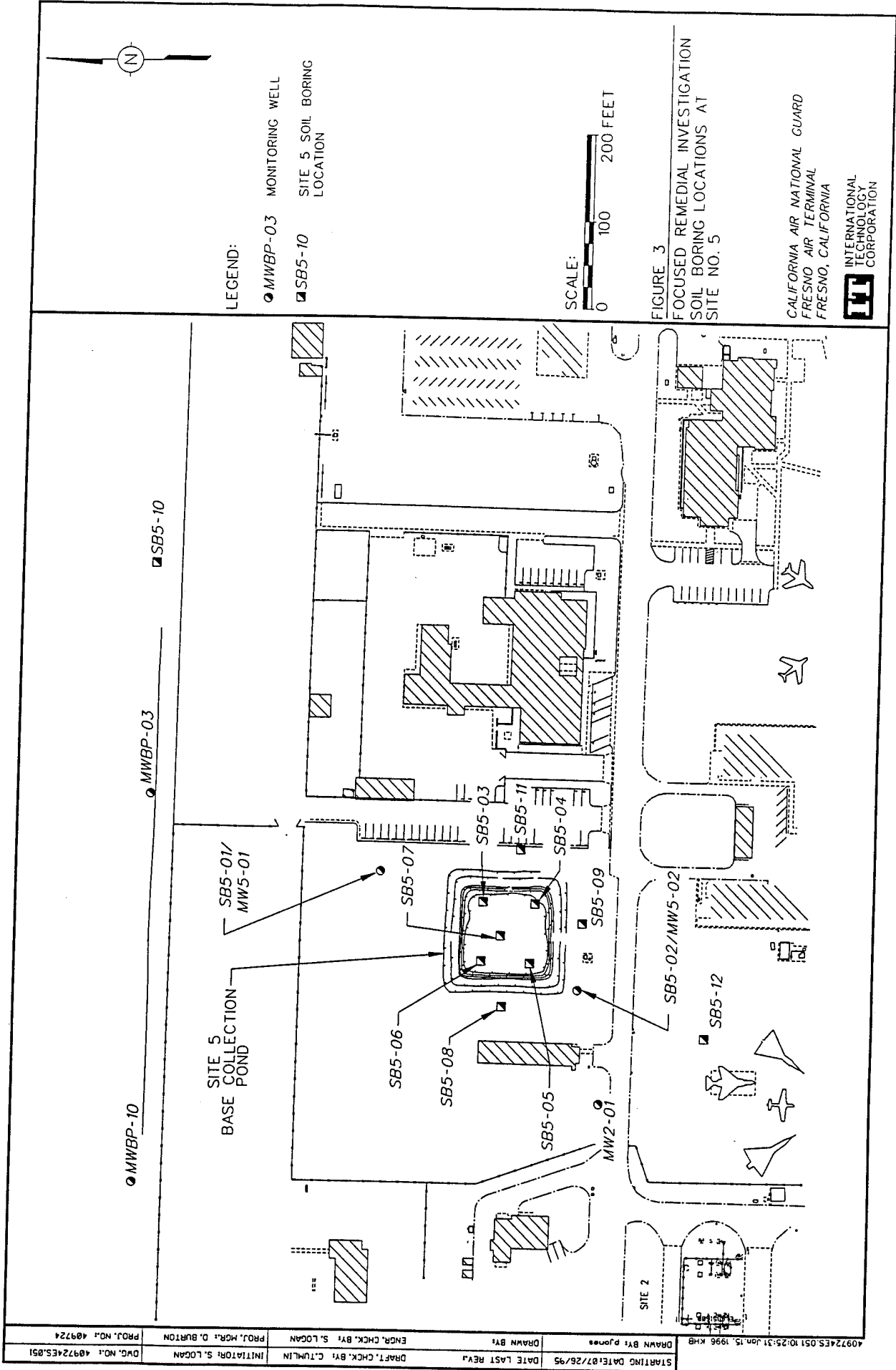


FIGURE 2
FOCUSED REMEDIAL INVESTIGATION
FIELD SCREENING LOCATIONS
AT SITE NO. 5

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depth of 85 feet bgs. The remaining two borings (SB5-10 and SB5-12) were located hydraulically up- and downgradient of the BCP, respectively. Boring SB5-10 is located approximately 500 feet upgradient and SB5-12 is located approximately 200 feet downgradient of the BCP. These last two borings were drilled primarily to collect groundwater screening samples for groundwater characterization; their results will not be discussed further.

Soil samples from the 10 borings in and around the BCP were collected at minimum 5-foot intervals. Each sample was analyzed on a GC in a field laboratory setting for chlorinated VOCs. Screening results provided by the field GC were used to select those soil samples which were to be shipped to a fixed-base laboratory for confirmation analysis. A total of 103 soil screening samples were collected from the 7 borings for field screening analysis. None of these samples reported any VOCs.

A total of 64 soil screening samples were collected from the 5 borings located at the bottom of the BCP (SB5-03 through SB5-07). Of the VOCs analyzed, PCE was detected in 18 samples, TCE was detected in 12 samples, and dichloroethene (various isomers) was detected in 2 samples.

PCE was detected at concentrations ranging from 51 to 640 $\mu\text{g}/\text{kg}$, with an average detection of approximately 190 $\mu\text{g}/\text{kg}$. TCE was detected at concentrations ranging from 51 to 410 $\mu\text{g}/\text{kg}$, with an average detection of approximately 170 $\mu\text{g}/\text{kg}$. Detections of PCE and TCE were sporadically distributed throughout the soil profile. At no specific depth interval were PCE or TCE always detected, nor was a continuous column (from the bottom of the BCP to the water table) of PCE or TCE present. Detections closer to ground surface were generally bounded above and below by nondetects. Detections within 10 to 15 feet of the water table were generally more continuous. TCE was only measured where PCE was also measured, suggesting that TCE was possibly present as a result of degraded PCE.

The sporadic detection pattern of the VOC screening results indicate that the low levels of contaminants detected are residual in nature. Screening results show that Site 5 is not currently contributing contaminants to the groundwater system. The low concentrations and their distribution pattern suggest that TCE and PCE are in an immobile state in the soil (IT, 1996). Screening results indicate that the BCP was at one time contributing PCE to the shallow groundwater system.

2.2.2.3 Results of Soil Confirmation Samples

Results of the GC screening combined with the lithologic observations were used to determine which consecutive-depth soil samples would be sent to the laboratory for confirmation chemical analysis. If the GC screening results were inconclusive, soil samples targeted for laboratory submittal were those collected from the bottom of the borehole or from immediately above or below fine-grained layers of increased moisture content. A maximum of four soil samples from each boring was submitted to an off-site, fixed-base laboratory for confirmation analysis. A total of 41 soil samples were submitted to a fixed-base laboratory for volatile and semivolatile organic compounds and TPH (diesel) analyses.

Only three VOCs were detected from the soil samples: acetone, methylene chloride, and TCE. Acetone was reported in two samples ranging in concentration from 100 to 200 $\mu\text{g}/\text{kg}$. These results were reported as estimated quantities. Methylene chloride was reported in 1 soil sample at a concentration of 25 $\mu\text{g}/\text{kg}$ in boring SB5-11 as an estimated quantity. TCE was detected in only two samples, both of which occurred in SB5-10, a background boring. Concentrations of TCE were reported at 5 and 4 $\mu\text{g}/\text{kg}$ at depths of 85.5 to 86 feet and 85 to 85.5 feet, respectively. Both detections were reported as estimated quantities below the instrument detection limit.

Three semivolatile compounds were detected among the samples: bis(2-ethylhexyl)phthalate, di-n-butyl phthalate, and diethyl phthalate. The most prevalent, bis(2-ethylhexyl)phthalate, was detected in several samples both within and outside the BCP. One background boring (SB5-01) reported this compound in all of the samples collected from it, at concentrations ranging from 70 to 12,000 $\mu\text{g}/\text{kg}$. Bis(2-ethylhexyl)phthalate was detected in four of the five borings at the bottom of the BCP at concentrations ranging from 55 to 8,500 $\mu\text{g}/\text{kg}$. Several of the reported concentrations were estimated quantities below the instrument detection limit. Based on a number of factors, the analytical data validation process concluded that bis(2-ethylhexyl)phthalate results likely represent a sampling or analytical artifact, and is not site related.

Di-n-butyl phthalate and diethyl phthalate were detected in one and four samples, respectively. Diethyl phthalate was reported in four samples from two borings (SB5-05 and SB5-06) ranging in concentration from 350 to 1,400 $\mu\text{g}/\text{kg}$. These phthalate compounds are also believed to be an artifact of either the sampling technique or the laboratory analysis, and not site related.

Of the 41 samples collected in association with Site 5 RI soil sampling, TPH (diesel) was not detected in any of the samples.

2.2.2.4 Discussion of Screening Versus Confirmation Sample Results

Soil sample results from the screening analysis versus the fixed-base laboratory analysis for VOCs do not agree. Screening results with the field GC showed TCE in about 20 percent and PCE in about 30 percent of the samples within the bottom of the BCP. Fixed-base laboratory results showed no detections of TCE or PCE for the samples collected within the BCP.

It has been well documented that even when prescribed sample preservation techniques are followed and when analyses are performed within the prescribed time frame (holding time), significant losses of VOCs can occur. Mechanisms responsible for the losses include volatilization, biodegradation, and chemical transformation (Siegrist and van Ee, 1994; Hewitt, et al., 1995; Lewis, et al., 1991; Siegrist and Jenssen, 1990; Maskarinec et al., 1992). As Siegrist and van Ee state (1994): "Loss of volatiles begins from the time a sample is collected to the time it is analyzed....A sample that is analyzed soon and with little disruption is more likely to be representative of actual site conditions."

This appears to be the case for the discrepancy observed from the two sets of data. While the screening data are not able to be validated to current standards, data provided from the field GC are considered to be more indicative of subsurface conditions. Laboratory results, while validated, do not accurately depict the profile of chemical constituents in soil at Site 5. Therefore, the discussion relating to soil screening sample results is more appropriate in determining the disposition of Site 5 in relation to a no-further-action recommendation.

Soil screening samples collected from beneath the bottom of the BCP showed the presence of residual PCE and TCE. The relatively low concentrations reported and their sporadic occurrence imply that the future migration potential is small. Additionally, the BCP has been filled in and will eventually capped with concrete or asphalt; this will remove the source for infiltration which could cause contaminant migration. In the past, substantial infiltration of rainwater and runoff occurred periodically with storm events. Since infiltration will be essentially eliminated from flowing through the impacted soil, no further migration to groundwater is expected to occur.

2.2.2.5 Groundwater Sampling Results

One monitoring well (MW5-01) is located hydraulically upgradient of the BCP; two are located immediately downgradient (MW5-02 and MW2-01, Figure 3). Two additional monitoring wells (MW2-02 and MW2-03) are located further downgradient from the BCP. The upgradient well and one downgradient well have been sampled three times. The other downgradient wells have been sampled a total of 5 times.

The two most frequently detected VOCs in the monitoring wells are TCE and PCE. As is documented elsewhere, TCE is present in groundwater from a source area located upgradient of the Base (ERM, 1994). Concentrations of PCE in the water table wells have remained stable or have decreased over the monitoring period. Concentrations in the three wells nearest to the BCP have decreased somewhat over the period from November 1990 to April 1993. For example, PCE in MW2-01 was at 47 micrograms per liter ($\mu\text{g/L}$) in November 1990 and was detected at 15 $\mu\text{g/L}$ in April 1993. Similar decreases are noted in wells MW2-02, MW2-03, MW5-01 and MW5-02. Decreasing concentrations near to the source area support the assertion that the contaminants detected in the soil (screening analyses) are immobile. PCE is not being added to the groundwater system.

2.3 Baseline Risk Assessment Summary

A baseline risk assessment was conducted to quantify at Site 5 the risk to human receptors that may occur under various scenarios if no remedial actions are taken to reduce the extent of present environmental contamination or potential exposure. A summary of the risk assessment is presented below; it can be found for reference in its entirety in the RI report (IT, 1996).

From existing and predicted future land use in the Base area, the transport pathways evaluated were air dispersion of soil contaminants at the Base and groundwater transport of contaminants to the Base boundary. The likely exposure would be to on-site Base workers and/or construction workers, with pathways limited to incidental soil ingestion, dermal contact with soil, and inhalation of contaminated dust from surface soils. Exposure to groundwater through ingestion, dermal contact and inhalation of volatiles during household water use were the pathways evaluated for hypothetical future home-dwellers at the Base boundary, drawing water from wells within the contaminated area.

Surface soil samples from Site 5 were found to contain semivolatile organic compounds and TPH (diesel). A cumulative sum of the cancer risk and noncancer risk (hazard quotient) for

each of the soil exposure pathways identified above and chemicals observed at Site 5 exhibits a cancer risk below the target range of 10^{-6} to 10^{-4} . All hazard index estimates were below the target of one.

Chemicals detected in the soil may leach to groundwater, resulting in potential exposure from drinking water. Detections from both the soil screening samples and soil confirmation samples were evaluated through leaching. No chemicals found in the soils at Site 5 would leach and be at concentrations above the regulatory maximum contaminant level for groundwater. A cumulative sum of the cancer risk and noncancer risk for each of the groundwater exposure routes identified above for chemicals leaching through soil to groundwater at Site 5 exhibits a cancer risk below the target range of 10^{-6} to 10^{-4} . All hazard index estimates were below the target of one.

Additionally, the BCP has been filled to grade with soil and all water drainage inlets have been decommissioned. This prevents any exposure to chemicals detected in surface soils and greatly reduces the potential for infiltration of water, thus decreasing the potential for PCE or TCE in soil at Site 5 to leach through soil and enter the groundwater system.

3.0 Conclusions

Data were collected during the SI and RI to characterize soil conditions at Site 5.

Semivolatile organics were detected at estimated concentrations in surface soil samples. PCE and TCE were sporadically detected in subsurface soil screening samples. Subsurface screening samples indicate that Site 5 did at one time impact shallow groundwater with PCE. However, current soil conditions show that PCE and TCE are in an immobile, residual state and are not expected to further impact groundwater. Recent Base construction activities have filled in Site 5 to grade and all drainage inlets have been rerouted. This greatly reduces the potential for infiltration and further vertical migration of soil contaminants.

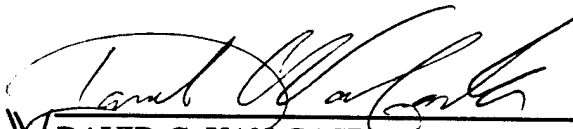
The baseline risk assessment concluded that Site 5 does not pose a threat to human receptors through either exposure to surface soils or through exposure to chemicals that have, or may, leached to groundwater.

The site has been adequately characterized during the various investigation stages to determine the magnitude and extent of contamination. Groundwater impacted by Site 5 will be addressed as the regional TCE plume is characterized and remediated.

4.0 Recommendations

Based on investigation results, risk quantification and the recent Base decommissioning of the BCP, it is recommended that soil at Site 5 be removed from any further investigation, sampling or risk-based analytical activities. A no-further-action decision for groundwater beneath Site 5 is not appropriate at the present time. Characterization and remediation of groundwater impacted from past Base activities is recommended to be included with the characterization of the regional TCE plume.

The ANGRC has reviewed the available data and recommends no further action under the IRP for soil at Site 5, Base Collection Pond, Fresno ANG Base.



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Chief, Environmental Division
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28 May 96
Date

5.0 References

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