Bechtel National, Inc.

NAVY
CLEAN II
PROGRAM

FINAL WORK PLAN
ANTHROPOGENIC PAH
REFERENCE LEVEL STUDY
MARINE CORPS AIR STATION
EL TORO, CALIFORNIA

CTO-0065/0108

Submitted to:

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Naval Facilities Engineering Command
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COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN II

FINAL WORK PLAN ANTHROPOGENIC PAH REFERENCE LEVEL STUDY MARINE CORPS AIR STATION EL TORO, CALIFORNIA

CTO-0065/0108

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Signature: _____ for
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Date: 12/12/95

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ACRONYMS/ABBREVIATIONS

BNI	Bechtel National, Inc.
BRAC	Base Realignment and Closure
CAS	chemical analysis survey
CLEAN	Comprehensive Long-Term Environmental Action Navy
CLP	(U.S. EPA) Contract Laboratory Program
COPC	chemical of potential concern
CTO	Contract Task Order
MCAS	Marine Corps Air Station
MS	matrix spike
MSD	matrix spike duplicate
MSL	mean sea level
PAH	polynuclear aromatic hydrocarbons
PRG	(U.S. EPA Region IX) preliminary remediation goal
QA	quality assurance
QA/QC	quality assurance/quality control
QC	quality control
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RPD	relative percent difference
SOW	Statement of Work
TAL	Target Analyte List
U.S. EPA	United States Environmental Protection Agency

Section 1
INTRODUCTION

The work plan has been prepared to guide the anthropogenic polynuclear aromatic hydrocarbon (PAH) reference level study at Marine Corps Air Station (MCAS) El Toro, California, under Contract Task Order (CTO)-0065 issued to Bechtel National, Inc. (BNI), by the Southwest Division Naval Facilities Engineering Command, contract No. N68711-92-D-4670.

1.1 PURPOSE OF PLAN

This work plan will identify the methods and rationale for the anthropogenic PAH reference level study. The potential exists for anthropogenic PAHs to be present in MCAS El Toro surface soils that are not associated with contaminated sites. These PAH constituents may artificially elevate volume estimates of soils to be remediated and unnecessarily increase the scope of environmental assessments. Therefore, reference levels specific to MCAS El Toro are proposed to be assessed and calculated to assist risk assessment activities and to develop action levels for surface soils. In addition, sample locations in the runway areas will also be assessed for levels of metals. These data will be used to assist future studies that may be conducted to determine if the runway areas can be transferred to the public in their present-day condition.

This work plan is a continuance of field activities under CTO-0065. It will follow the protocols as approved in Field Sampling Plan, Quality Assurance Project Plan, Data Management Plan, Investigation-Derived Waste Management Plan, and Site-Specific Health and Safety Plan Supplement, as presented in the Final Addendum to the RCRA Facility Assessment Work Plan for MCAS El Toro (BNI 1995a).

1.2 CHEMICALS OF POTENTIAL CONCERN

The chemicals of potential concern (COPCs) identified for this study are PAH constituents and metals. The list of PAH constituents will consist of those associated with U.S. EPA Method 8310. The list of U.S. EPA Method 8310 COCs is contained in Section 3.5. The list of metals will consist of those associated with the U.S. EPA Method for TAL metals as set by the Contract Laboratory Program (CLP) Statement of Work (SOW).

1.3 OBJECTIVES

The primary objective of this study is to determine if it is possible to estimate a reference level for endemic PAHs in MCAS El Toro surface soils not associated with contaminated sites. In addition, a related objective is to compare immunoassay test kit results with validated, fixed-base laboratory results to assess the benefit of using the immunoassay test kits during remedial and removal actions at MCAS El Toro. A secondary objective is to assess the surface soils collected in the runway areas for metals to assist future studies that may be conducted for these areas.

Section 2
BACKGROUND AND SETTING

MCAS El Toro is located in a semiurban agricultural area in southern California, approximately 8 miles southeast of Santa Ana and 12 miles northeast of Laguna Beach (Figure 2-1). Northwest of MCAS El Toro, the land is used for agricultural purposes. The land south and northeast is used mainly for commercial, light industrial, and residential purposes. The closest residential areas are the cities of Lake Forest, Irvine, and Laguna Hills.

The MCAS El Toro property slopes gently to the west-southwest and extends across a broad alluvial valley (Tustin Plain) and into the Santa Ana Mountains. At the west corner of the facility, elevations begin at approximately 215 feet mean sea level (MSL) and rise to approximately 800 MSL at the east corner of the station in the foothills of the Santa Ana Mountains. The highest peak of the Santa Ana Mountains, rising steeply to the north and east, is located approximately 10 miles east of the station. Ten miles south of the station is the highest peak of the San Joaquin Hills, which gradually rise to the south. The land northwest of the station is relatively level (Jacobs 1993a).

2.1 RECENT STATION OPERATIONS

MCAS El Toro provides materials and support for aviation activities of the United States Marine Corps. The station comprises runways, aircraft maintenance, training facilities, housing, shopping facilities, and other support facilities. Currently, the station is undergoing the Base Realignment and Closure (BRAC) process. Some operations have closed, and various parts of the station are no longer in use. Squadrons have been transferred to other Marine Corps and Naval stations.

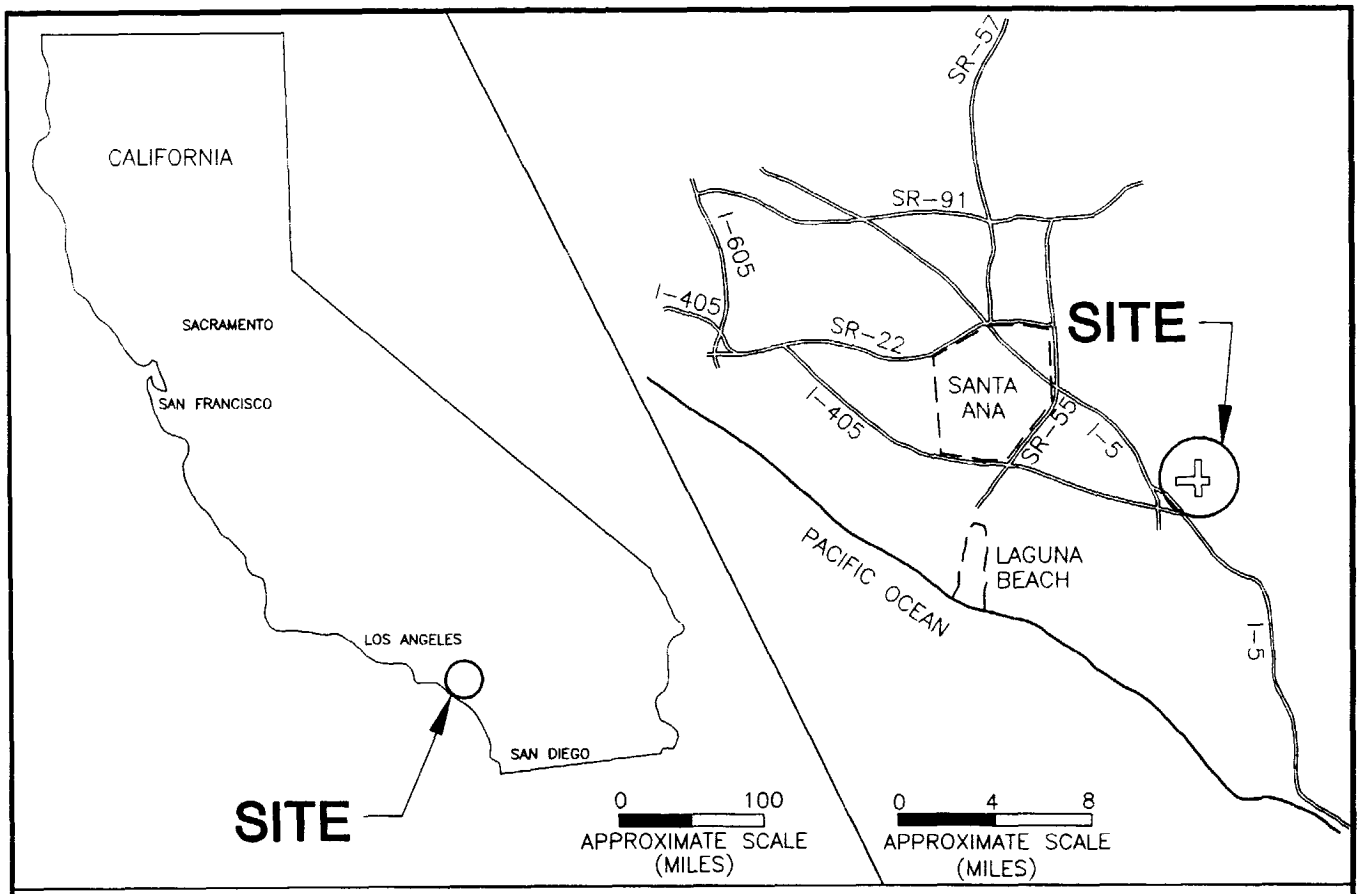
Currently, hazardous materials wastes are managed under Resource Conservation and Recovery Act (RCRA) requirements. Hazardous wastes are stored in containers at general accumulation areas and are held for less than 90 days. The on-station RCRA Interim-Status Storage Facility holds these wastes until they are released for disposal. MCAS El Toro contracts with waste transporters and treatment, storage, and disposal facilities to transport, recycle, treat, or dispose of hazardous wastes.

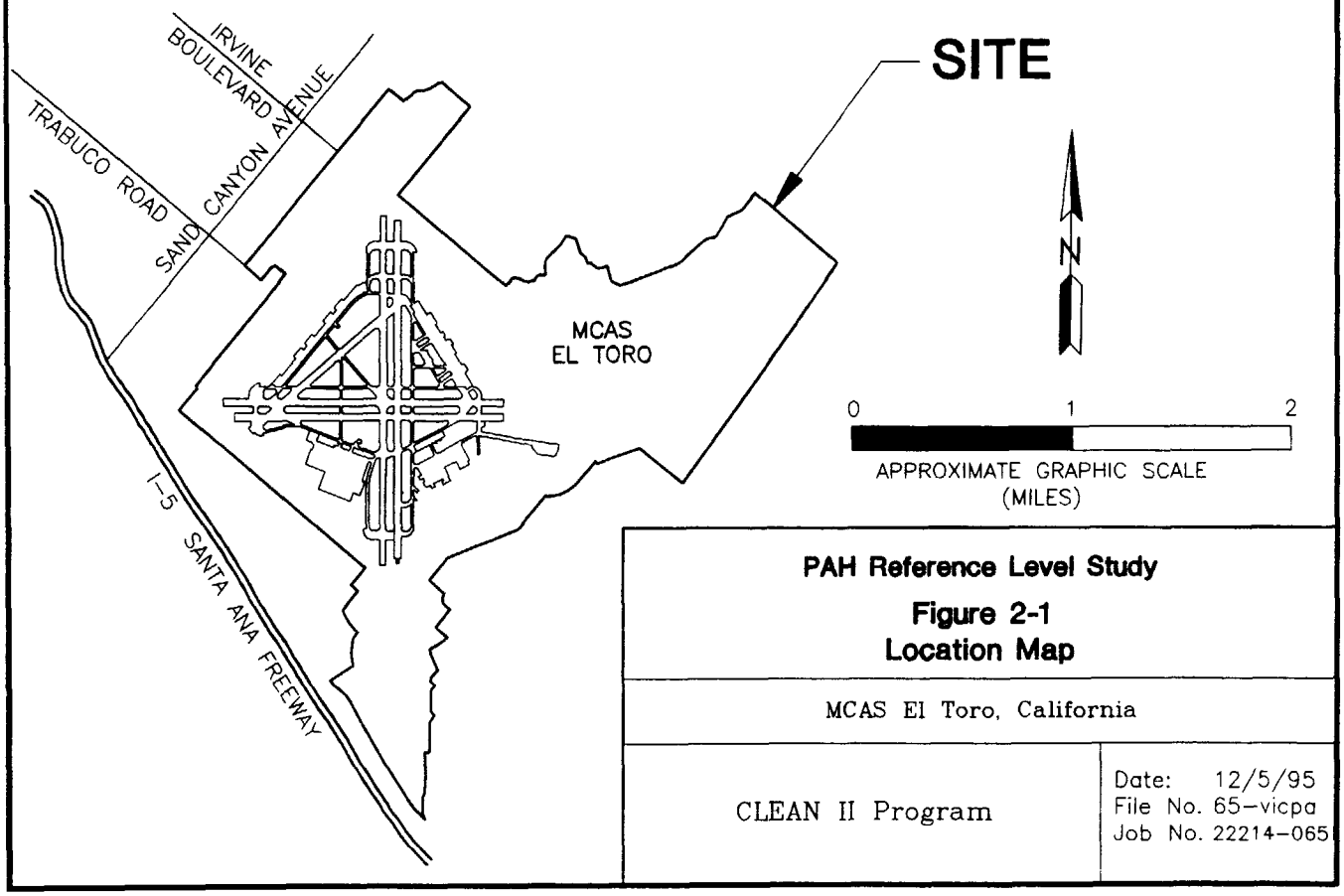
2.2 LAND USE

MCAS El Toro encompasses about 4,738 acres. Approximately 1,000 acres are designated for outleases because airfield safety clearances render them unsuitable for any other use. The outleased lands are at the corners of the station and are used for agricultural purposes, including landscape nurseries, livestock grazing, and crop production. Crops grown on-station include strawberries, winter celery, tomatoes, and avocados (MCAS El Toro 1991).

General land uses of MCAS El Toro are described in four quadrants, as defined by the bisecting north-south and east-west runways.

- The northwest quadrant consists of administrative services (including the MCAS El Toro headquarters, family and bachelor housing, and community support services).





PAH Reference Level Study

Figure 2-1
Location Map

MCAS El Toro, California

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- The northeast quadrant consists of Marine aircraft group activities (including training, maintenance, supply and storage, and aircraft operations), family housing, community services, and ordnance disposal in areas isolated by topographic relief and distance from other developments.
- The southeast quadrant consists of administrative services, maintenance facilities, ordnance storage, and the golf course.
- The southwest quadrant consists of maintenance facilities, supply and storage facilities, and limited administrative services.

More specifically land use on MCAS El Toro can be divided into seven distinct land uses:

- foothills (open land);
- golf course;
- housing;
- agricultural;
- administrative buildings;
- maintenance buildings; and
- runways.

2.3 PREVIOUS INVESTIGATIONS

Several investigations have been conducted at MCAS El Toro. These include an initial assessment study conducted in 1985 (Brown and Caldwell 1986), a Phase I remedial investigation (RI) conducted in 1993 (Jacobs 1993a), and a RCRA facilities assessment conducted in 1993 (Jacobs 1993b). Presently, a Phase II remedial investigation/ feasibility study (RI/FS) is being conducted (BNI 1995b).

The results to date of these investigations indicate that certain areas of the station have been contaminated by chemicals previously used at the station. For more information on these investigations, see the Final Work Plan for the Phase II RI/FS MCAS El Toro (BNI 1995b).

Section 3
WORK PLAN RATIONALE AND APPROACH

This work plan identifies the rationale and methods for the anthropogenic PAH reference level study at MCAS El Toro. Surface soil samples will be collected from locations chosen according to a systematic random method. The soil samples will be chemically analyzed for PAHs using four methods. The soil samples will be analyzed by two fixed-base laboratory methods and two field-screening methods using immunoassay test kits. This will allow the study to compare the results of validated fixed-base laboratory analyses with the results of immunoassay test kits to assess the performance and utility of screening kits for future Navy environmental tasks involving PAHs. The validated fixed-base laboratory results will also be used to statistically calculate PAH reference levels. Immunoassay results will not be used for PAH reference level calculations. In addition, surface soil samples collected near the runways will also be analyzed by a fixed-base laboratory for metals to assess levels of these chemicals.

3.1 STUDY BOUNDARIES

The study area will consist of the entire area of MCAS El Toro. This study will involve surface soil sampling at the station to assess the levels of anthropogenic PAH not associated with contaminated sites. Surface soils are an appropriate media based on the presumption that the anthropogenic PAH constituents are generated from engine exhaust (cars, planes, etc.), industrial power generation, incinerators, and other sources and are delivered to the environment as aerosols and particulate in surface soils (Clement International Corp. 1993). In addition, sample locations in the runway areas will also be assessed for levels of metals. These data will be used to assist future studies that may be conducted to determine if the runway areas can be transferred to the public in their present-day condition. Surface soil that is covered with paving material, buildings, other structures or coverings will not be sampled. This will allow the study to evaluate anthropogenic PAH in surface soils that represent present-day conditions. This study should conclude in approximately 4 months.

3.2 MOBILIZATION, FIELD STAKING, AND UTILITY CLEARANCE

Mobilization efforts include all planning, scheduling, and coordination necessary to carry out the field activities described in Section 3.3. Before sampling begins, each sample location will marked by driving a wooden stake into the ground. Conducting an utility clearance will not be necessary prior to sample collection because the depth of sampling will only penetrate to 6 inches below ground surface. Each final sampling point will be located by survey, using the 1983 North American Datum State Plane Coordinate System, with northings and eastings determined to the nearest 0.1 foot. The surface elevation will be determined to the nearest 0.01 foot.

3.3 FIELD SAMPLING METHODS

Approximately 20 surface soil samples will be collected during the study. Each sample will be analyzed by a fixed-base laboratory and field screened using immunoassay test kits. Samples will be collected from 0 to 6 inches below the ground surface. Soils that

are covered with paving material, buildings, other structures or coverings will not be sampled. All samples will collected with hand augers. The specific locations of the samples to be collected are illustrated on Figure 3-1. Soil will be mixed prior to placement in containers to homogenize and enhance the representativeness of the soils collected. Details of field sampling procedures are presented in Attachment A, Section 6.3, of the Final Addendum to the RCRA Facility Assessment Work Plan for MCAS El Toro (BNI 1995a).

3.4 ANALYTICAL METHODS

The analytical methods that will be used to field screen and analyze all surface soil samples in this study are:

- field screening for PAH in soil samples will be conducted using ENSYS immunoassay kits for PAHs (U.S. EPA Method 4035) and OHMICRON RaPID Assay® for PAHs; and
- off-site, fixed-base laboratory analyses for PAHs using U.S. EPA Method 8310, semivolatile organic compounds using U.S. EPA Method 8270M (National Oceanic and Atmospheric Administration Status & Trends), and for soil samples collected in the runway areas the U.S. EPA Method for TAL metals as set by CLP SOW.

Table 3-1 below lists the PAH COPCs for the anthropogenic PAH reference level study at MCAS El Toro. Table 3-2 summarizes the proposed sampling locations and matrices, number of samples, and analyses for which they will be submitted, and the applicable container(s), preservative, holding time, and other relevant information, in accordance with project procedure guidance.

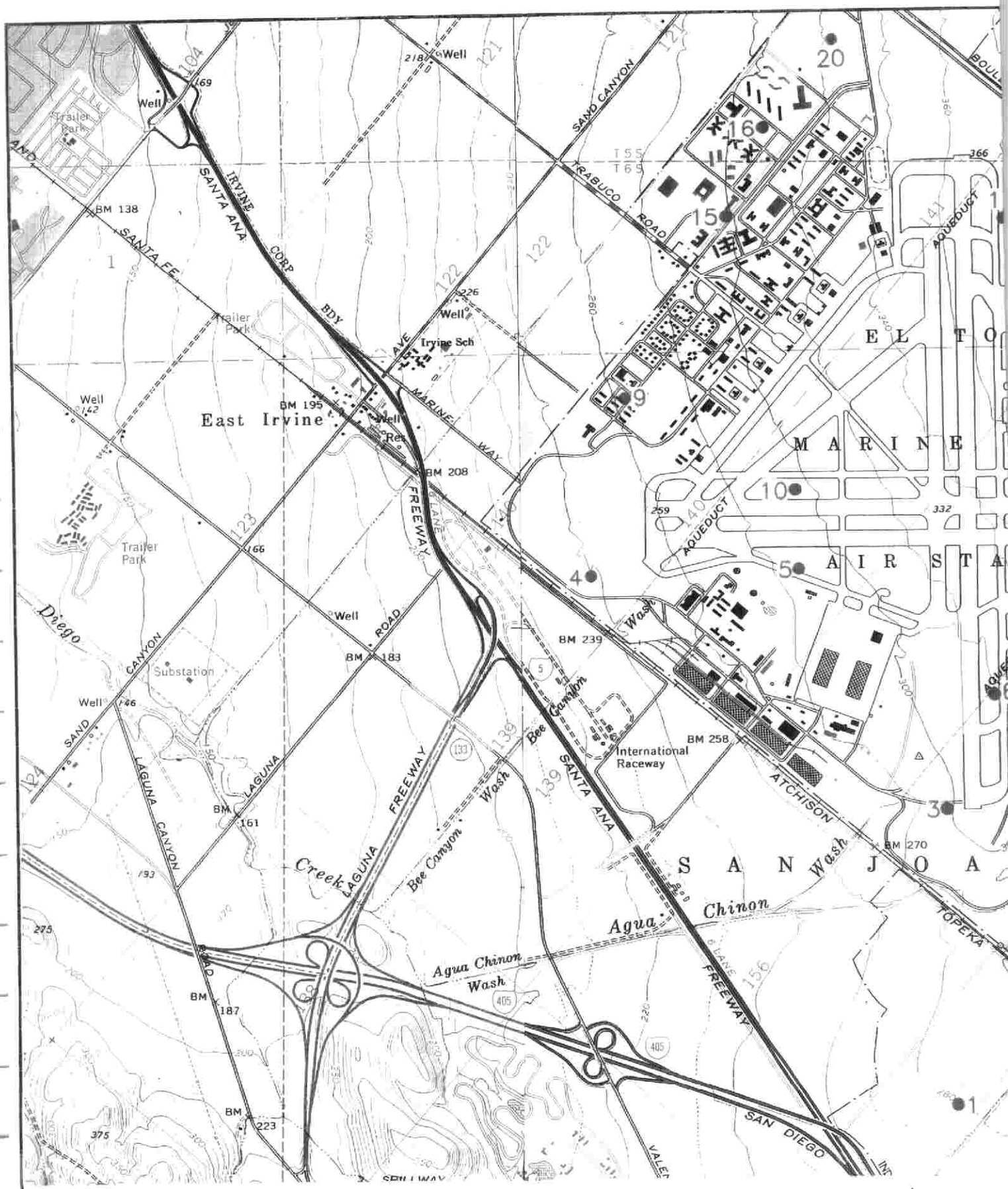
3.5 QUALITY CONTROL SAMPLES

Both field and laboratory quality assurance/quality control (QA/QC) checks will be performed to evaluate the performance of field and laboratory analytical procedures. QA/QC checks will involve introducing samples into the sampling and analytical system to enable evaluation of analytical accuracy and precision. QC samples are used to:

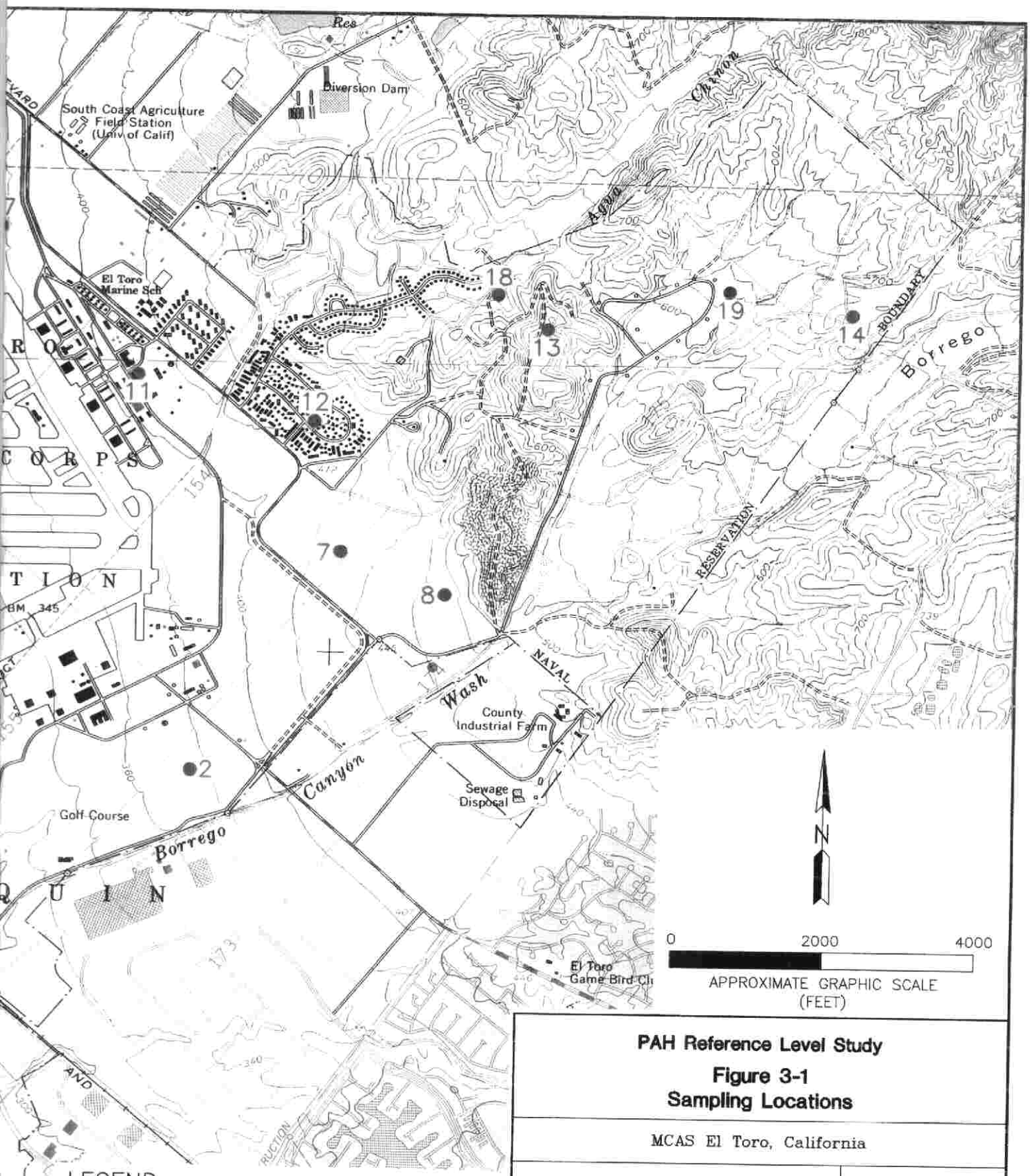
- assess data quality in terms of precision and accuracy; and
- verify that sampling conditions, such as ambient site conditions, chain of custody, decontamination, packaging and shipping, are not introducing variables into the sampling chain that could render the validity of samples questionable.

3.5.1 Duplicate Samples

Duplicate samples will be collected by the sampling team and will be used as a relative measure of the precision of the sample collection process. Duplicates will be prepared following standard sampling and preparation techniques. Duplicates are matrix specific. Duplicates will be submitted to a fixed-base laboratory "blind" (with no indication of the



SOURCE: U.S.G.S. 7.5' EL TORO AND TUSTIN QUADRANGLE MAPS (PHOTO REVISED 1982)



LEGEND:

20● APPROXIMATE LOCATION OF SAMPLE

PAH Reference Level Study

Figure 3-1
Sampling Locations

MCAS El Toro, California

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Table 3-1
Polynuclear Aromatic Hydrocarbon Chemicals of Concern[a]

CAS[b] NUMBER	Polynuclear Aromatic Hydrocarbons (PAH)
83-32-9	acenaphthene
208-96-8	acenaphthylene
120-12-7	anthracene
56-55-3	benzo(a)anthracene
50-32-8	benzo(a)pyrene
205-99-2	benzo(b)fluoranthene
191-24-2	benzo(g,h,i)perylene
207-08-9	benzo(k)fluoranthene
218-01-9	chrysene
53-70-3	dibenzo(a,h)anthracene
206-44-0	fluoranthene
86-73-7	fluorene
193-39-5	indeno(1,2,3-cd)pyrene
91-20-3	naphthalene
85-01-8	phenanthrene
129-00-0	pyrene

Notes:
[a] as defined by United States Environmental Protection Agency (U.S. EPA) Method 8310
[b] CAS – chemical analysis survey

Table 3-2
Analytical Request Summary

Sample	Matrix	Analytes	Container	Sample Volume	Preservation	Holding Time	Comments
PAH sample locations 1 through 20	Soil	PAH[a]	Plastic bag	20 grams	None	NA	Screening samples
		PAH	WMGJTL[b]	8 ounces	4°C	14 days	Off-site samples
Metal samples locations 3, 4, 5, 6, 10, and 17	Soil	TAL[d] Metals	WMGJTL	8 ounces	4°C	< 6 months (28 days for Hg)	Off-site samples
Rinsate blank[e] (Daily)	Analyte-free H_2O	PAH	AGTL	80 ounces	None	14 days	

Notes:

[a] PAH – polynuclear aromatic hydrocarbons
[b] WMGJTL – wide-mouth glass jar, Teflon®-lined lid
[c] AGTL – amber glass jug, Teflon-lined lid
[d] TAL – target analyte list
[e] source blanks will be collected by Contract Task Order (CTO)-0076 and CTO-0079; no trip blanks are required because no volatile organic compound analyses will be performed

contents or associate sample) for the same analyses as the samples to independently assess the precision of the laboratory. The procedure for assessing precision is to calculate the relative percent difference (RPD) and standard deviation. The RPDs are then plotted on QC charts. Immunoassay test kits will analyze a duplicate field sample to document method reproducibility.

3.5.2 Blanks

Blanks will be used to assess whether contaminants are being introduced into the sample at any given point. Two kinds of blanks will be used: source water blanks and equipment rinsate blanks. Source water blanks will be prepared by collecting a sample of the source water used for the final rinse during decontamination to assure that the source water is free of any contaminants that could be introduced to the samples during collection.

Equipment rinsate blanks are prepared by collecting samples of organic-free water that is used to rinse decontaminated sampling tools. Doing so allows evaluation of the decontamination procedures.

3.5.3 Field Quality Control Checks

Duplicate samples will be collected at the frequency of 1 per 20 samples for fixed-base analyses samples. Immunoassay test kits will be used to analyze a duplicate field sample 1 per every 20 samples or 1 sample per day whichever is greater. Equipment rinsate blanks and source blanks will be collected at a minimum of 1 sample per day.

3.5.4 Laboratory Quality Control Checks

Laboratory method blanks and calibration standards will be used by the off-site laboratory during analyses as required by the U.S. EPA Contract Laboratory Program (CLP) Statement of Work (1990 or later version) and the methods being used. The procedures for conducting laboratory checks are listed below.

- Instruments will be calibrated according to the manufacturer's instructions and as required by the U.S. EPA CLP analytical method used. Where there are no specifications for a parameter, a three-point calibration curve will be implemented.
- Continuing calibration standards will be analyzed for each method performed at the beginning and end of each laboratory shift.
- An analysis of laboratory method blanks by each analytical method will be made as necessary for the laboratory internal CLP or Naval Facilities Engineering Service Center QA compliance.
- An analysis of 1 matrix spike sample will be made for every 20 samples and will be fortified with representative compounds for each analytical method performed.

- An analysis of 1 matrix spike sample will be made for every 20 samples analyzed, or 1 per batch, whichever is greater.

The term "matrix" refers to the use of the actual media collected in the field. Laboratory QC samples are an aliquot (subset) of the field samples. A routinely collected soil sample contains sufficient volume for routine sample analysis and additional laboratory QC analysis, including matrix spike (MS) and matrix spike duplicate (MSD) analysis. No environmental water matrix samples are planned for this study.

3.6 SAMPLING DESIGN

The proposed sampling design for this study is systematic random sampling based on a grid. This method uses random positioning to produce an unbiased sample location configuration. It is important that the sampling design represent a random and unbiased sampling scheme so that uncertainty in the sampling design can be controlled and the analytical results can be evaluated statistically. Systematic random sampling based on a grid was chosen as the sampling design for this study for the following reasons:

- systematic random sampling based on a grid is a good method for estimating trends or patterns; and
- systematic random sampling based on a grid is a good method for estimating the mean when trends or patterns in concentrations are not present or when strictly random methods are impractical (Gilbert 1987).

The proposed 20 sample locations are illustrated on Figure 3-1. They have been located by the following procedure.

- Select an initial starting location (defined as the intersection of points randomly located along the x and y axes laid out on the perimeter of the site).
- Locate the remaining grid nodes (from the random starting location a systematic square grid is constructed with each node [x/y coordinate] space at a predetermined but fixed distance from the previous location).
- Build the grid progressively outward from the starting location in all directions until the entire area to be investigated is covered.
- Once the grid is completed, randomly position the one sampling location within each of the grid cells.
- If the sampling location falls on unacceptable surface, a new random position is chosen.

3.7 DATA VALIDATION AND STATISTICAL ANALYSIS

Data quality will be assessed by data management personnel as designated according to the Comprehensive Long-Term Environmental Action Navy (CLEAN) II Program organization. Data validation will be performed by an independent subcontractor and will be consistent with Comprehensive Environmental Response, Compensation, and Liability Act requirements.

The data may be statistically analyzed using one or more of the following methods:

- basic statistical strategy (estimating confidence limits on quantiles, proportions, and means);
- Wilcoxon Rank Sum Test; and
- Quantile Test.

These methods may be used to:

- assess if the number of data collection locations is sufficient to estimate statistically valid reference levels for PAH;
- detect and estimate trends in the population; and
- make comparisons between populations.

3.8 PROJECT SCHEDULE

The estimated required project duration to complete the scope of work described in this work plan is 4 months. Table 3-3 identifies the project deliverables and their currently scheduled submittal dates.

Table 3-3
Schedule of Project Deliverables and Milestones

Deliverable/Milestone	Submittal Date
Final Work Plan	11 December 1995
Site Mobilization	18 December 1995
Duration of Field Activities	1 week
Draft Report	16 February 1996
Final Report	1 April 1996

Section 4
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