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SAMPLE STRATEGY PLAN

OPERABLE UNIT NO. 15
SITE 88

MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

CONTRACT TASK ORDER 0356

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Prepared for:

DEPARTMENT OF THE NAVY
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1.0 INTRODUCTION

This Sample Strategy Plan (SSP) presents an overview of the Remedial Investigation (RI) scope of work for Operable Unit (OU) No. 15. OU No. 15 includes Site 88 (Building 25) at Marine Corps Base (MCB), Camp Lejeune, North Carolina (Figure 1-1).

The purpose of the SSP is to provide the Department of Navy (DoN), Atlantic Division, Naval Facilities Engineering Command (LANTDIV), MCB Camp Lejeune, United States Environmental Protection Agency (USEPA) Region IV, and the North Carolina Department of the Environment, Health, and Natural Resources (NC DEHNR) with a summary of the proposed field investigations that will be presented during an upcoming project scoping conference call. This document is meant to be used as a supplement to the scoping conference call, and is not intended for formal comment. Questions or comments on the proposed field investigations will be addressed during the conference call.

This document provides a brief description of the site history, summary of previous investigations, and the finding of the site visit. The proposed field investigations are briefly described herein, including the objectives and sampling rationale.

2.0 SITE LOCATION AND SETTING

Site 88, MWR Dry Cleaners, is located near Post Lane and Virginia Dare Drive (Figure 2-1). Building 25 is currently operating as a dry cleaning facility. Five USTs were located along the northern perimeter of Building 25. Numerous underground utilities are located within the vicinity of Building 25 as shown on Figure 2-1. Building 25 is located in a flat area surrounded by barracks, office buildings, and other occupied structures. The surrounding buildings include Building 37 to the north, Building 43 to the west, Building HP57 to the east and Building 80 to the south. The New River is the nearest surface water body, located approximately 3,000 feet downgradient of Building 25. The nearest known water supply well (HP603) is located approximately 2,100 feet east - south east of the site.

2.1 Site History

Building 25 is currently operating as the base dry cleaning facility. Five USTs located adjacent to building were used to store dry cleaning fluids. The USTs were reportedly installed in the 1940's, at the time the building was constructed. These USTs were used in conjunction with the dry cleaning operations until the early 1970's. During this time, Varsol, a dry cleaning fluid, was stored in the USTs. Because of Varsol's flammability, its use was discontinued in the 1970's and replaced with perchloroethylene (PCE). PCE was stored in 150 gallon aboveground storage tanks outside Building 25 from the 1970's to mid-1980's. Currently, the dry cleaning machines are equipped with containment units, eliminating the need for the aboveground tanks. There are two dry cleaning units in operation. One unit was brought on-line in December, 1986, and the second in March, 1995. Groundwater contamination at Site 88 was discussed during the UST removal conducted in November 1995.

2.2 Previous Investigations

OHM Remediation Services Corporation (OHM) performed a UST removal at Building 25 in November 1995. As a follow-up to the tank removals, a four-well site check was conducted in November 1995 by OHM to identify and/or verify the suspected contaminant impact in the subsurface soil and groundwater. The activities and findings included:

- Installation of four temporary monitoring wells (25-TW01 through 25-TW04) around the former UST removal site. These wells were installed by Microseeps under the supervision of Baker Environmental, Inc. (Baker) personnel. The wells were set 14.6 to 16.8 feet below ground surface (bgs). Groundwater was encountered approximately 6 to 8 feet bgs. Figure 2-2 presents the temporary monitoring well locations.

- A total of five soil samples were collected from the four well borings. Full TCL/TAL and TPH analysis of the subsurface soil samples revealed elevated levels of PCE ranging from 13 µg/kg to 55 µg/kg in three of the four wells, 1,2-dichloroethene (total) at a concentration of 9 µg/kg, and two common laboratory contaminants (acetone and methylene chloride). Several metals also were detected in the subsurface soil samples. No pesticides, PCBs, TPH, or SVOCs were detected in any of the subsurface soil samples. The VOC and metal exceedances are presented on Table 2-1.

- One groundwater sample was collected from each of the four temporary monitoring wells and analyzed for full TCL/TAL and TPH. The analytical results are presented in Table 2-2. Iron and nickel were detected above the North Carolina standard of 100 µg/L in all four wells. TPH was detected in groundwater sample TW-02 and TW-03 at concentrations of 628 µg/L and 552 µg/L, respectively. Bis(2-ethylhexyl)phthalate and napthalene were detected in the groundwater; however, bis(2-ethylhexyl)phthalate is considered a laboratory contaminant. PCE was detected in all the groundwater samples at concentrations ranging from 416 µg/L in groundwater sample TW-02 to 29,200 µg/L in groundwater sample TW-04. 1,2 dichloroethene was detected in groundwater samples TW-02 and TW-03 at concentrations of 154 µg/L and 10,000 µg/L, respectively. Trichloroethylene was detected in groundwater sample TW-03 at a concentration of 2,750 µg/L. No pesticides or PCBs were detected in the four groundwater samples.

No other investigations have been performed at this location.

2.3 Site Visit

The following provides a brief description of Site 88 field observations which were noted during the site visit conducted by Baker on March 4, 1996. Figure 2-2 depicts the locations of the features noted during the site visit. Photographs 2-1 through 2-4 were taken during the site visit. Photograph 2-1 depicts the northern side of the building where the USTs were located. Photograph 2-2 depicts an old PCE inlet pipe through a window. The southern side of the building is shown on Photograph 2-3 and Photograph 2-4 provides a view looking south of Building 25.

During the site visit, the wells which were installed around the UST excavation and building were located and water levels were measured from the top of the casing and are shown below.

25TW-01	5.91 feet bgs
25TW-02	6.49 feet bgs
25TW-03	7.75 feet bgs
25TW-04	8.02 feet bgs

The manager of the dry cleaning facility was interviewed by Baker. Information obtained during the interview pertinent to this investigation is provided in Section 2.1.

2.4 Proposed Sample Strategy

The following sample strategy is proposed for additional sampling activities at Site 88. The strategy consists of performing the investigation in two phases. Phase I is to assist in defining the extent of shallow groundwater contamination, and to determine if VOCs are acting as a source in subsurface soil. Phase II will assist in defining the extent of contamination and support the remedial action to be performed at Site 88.

2.4.1 Phase I

Soil borings and temporary monitoring wells will be installed around the site utilizing direct push technology. In addition, soil and groundwater sampling are also proposed. Figure 2-3 identifies the

proposed soil boring/temporary monitoring well locations. The number and locations of soil borings are subject to change during the field investigation, based on field observations.

2.4.1.1 Soil Investigation

The proposed soil investigation was developed with consideration to the potential soil contaminant migration and exposure routes at Site 88. The potential soil contaminant migration route is contaminant transport to shallow groundwater via contaminant leaching and infiltration. Potential exposed populations include military and civilian personnel involved in the day-to-day operations.

To determine if soil is a possible source of groundwater contamination, one subsurface soil sample will be collected from a minimum of 12 soil boring locations in the vicinity of Building 25. Subsurface soil samples will be collected just above the water table. A second sample from each soil boring also may be submitted for analysis if evidence of contamination (i.e., visible or by monitoring instrument) is noted. Additionally, a mid-depth sample will be collected if depth to groundwater is greater than 10-feet bgs. The subsurface soil samples will be analyzed on-site via mobile laboratory for Target Compound List (TCL) volatile organic compounds (VOCs). All samples with positive detections will also be analyzed for TCL VOCs at a fixed base analytical laboratory to confirm the results of the mobile laboratory. Additional borings will be installed if deemed necessary to further delineate the extent of the contamination (i.e., placing additional sample locations closer or further away from Building 25).

2.4.1.2 Groundwater Investigation

The proposed Phase I groundwater investigation was developed with consideration to characterizing shallow groundwater contamination.

A minimum of twelve shallow temporary monitoring wells to determine groundwater flow, and to determine the extent of vertical contaminant migration. If contamination is detected in these wells, additional temporary wells will be installed, sampled, and analyzed on-site until the contamination is sufficiently delineated.

All groundwater samples will be analyzed on-site via mobile laboratory for Target Compound List (TCL) volatile organic compounds (VOCs). All samples with positive detections will also be analyzed for TCL VOCs at a fixed base analytical laboratory to confirm the results of the mobile laboratory.

2.4.2 Phase II

Permanent monitoring wells will be installed during the second phase of work at Building 25. The quantity and placement of the monitoring wells will be dependent on the results of the Phase I results.

2.4.2.1 Groundwater Investigation

The proposed Phase II groundwater investigation was developed with consideration to the proposed remedial action.

Approximately 4 shallow (Type II) monitoring wells will be installed in the vicinity of Building 25 to monitor the PCE contamination. The shallow monitoring wells will be a flush-mount construction. The groundwater samples collected will be analyzed for TCL VOAs on a routine laboratory turnaround time. One of the shallow monitoring wells will be a 4 inch well to be utilized for groundwater recovery/remediation. This well will be installed in an area of highest groundwater contamination identified from the Phase I work.

Three intermediate depth monitoring wells will be installed to determine the extent of vertical contaminant migration. The screened interval for the intermediate monitoring well will be 40 to 55 feet bgs. The intermediate monitoring wells will be flush-mount construction. One of the intermediate wells will be a 4 inch well to be utilized for groundwater recovery/remediation. The groundwater samples collected will be analyzed for TCL VOAs on a routine laboratory turnaround time.

All groundwater samples will be analyzed for TCL VOCs (Level IV quality). One of the groundwater samples will additionally be analyzed for BOD/COD/TSS /TDS in order to assist the remedial design/action. All monitoring wells will be surveyed for horizontal and vertical control. Groundwater measurements will be taken to confirm groundwater flow direction.

Type II shallow monitoring wells will be installed within the surficial aquifer at an estimated depth of 5 to 25 feet bgs. The Type II intermediate monitoring wells will be installed to a depth of approximately 55 feet bgs. The bottom of the intermediate monitoring well will be placed at the top of the semi-confining layer.

TABLES

TABLE 2-1

SOIL ANALYTICAL RESULTS
OPERABLE UNIT NO. 15 (SITE 88)
CTO 0356
MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte	Residential RBC (mg/kg)	Industrial RBC (mg/kg)	Soil Protection of Groundwater	TM-01	TM-01D	TM-02	TM-03	TM-04
Metals (mg/kg)								
Aluminum	1,000,000	78,000	--	5,240	5,260	1,950	5,200	6,840
Arsenic	3.8	0.43	15	BDL	BDL	1.34	BDL	BDL
Chromium	10,000	390	19	6.2	7.0	4.4	6.63	7.82
Iron	610,000	23,000	--	770	1,430	871	2,610	3,700
Lead	--	400	--	7.2	5.23	4.86	19.8	6.82
Manganese	286,000	11,000	--	3.45	5.38	BDL	2.9	4.26
Mercury	610	23	3	BDL	BDL	BDL	0.41	BDL
Vanadium	14,000	550	--	BDL	7.37	BDL	8.12	8.96
Zinc	610,000	23,000	42000	BDL	2.91	BDL	BDL	3.11
VOCs (µg/kg)								
Acetone	200,000,000	7,800,000	8000	15	35	61	83	19
Methylene Chloride	760,000	85,000	10	53	51	BDL	BDL	34
Trichloroethylene	110,000	12,000	40	13	BDL	55	36	BDL
(total) 1,2-Dichloroethene	18,000,000	700,000	--	BDL	BDL	9	BDL	BDL

Notes:

BDL = Below Detection Limit
Shaded areas indicate non compliant concentrations

TABLE 2-2

TEMPORARY MONITORING WELL GROUNDWATER SAMPLE ANALYTICAL RESULTS
OPERABLE UNIT NO. 15 (SITE 88)
CTO 0356
MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte	Federal MCL	North Carolina	TW-01	TW-02	TW-02D	TW-03	TW-04
Metals (µg/L)							
Aluminum	--	--	9,010	9,270	4,580	8,110	7,790
Calcium	--	--	5,820	9,770	9,710	14,300	BDL
Chromium	100	50	14	15	11	15	15
Iron	--	300	4,790	4,520	3,770	10,100	4,740
Lead	15	15	5	5	4	5	BDL
Manganese	--	50	40	40	37	47	25
Nickel	100	100	132	222	231	197	279
Sodium	--	--	11,300	7,750	7,640	BDL	8,210
Zinc	--	2,100	350	210	BDL	BDL	230
TPH (µg/L)	--	--	BDL	628	786	552	BDL
SVOCs (µg/L)							
Bis(2-ethylhexyl)phthlate	--	--	0.02	BDL	BDL	0.624	BDL
Napthalene	--	--	BDL	BDL	BDL	0.53	BDL
VOCs (µg/L)							
Perchloroethylene	5	0.7	1,620	416	346	4,190	29,200
(total) 1,2 dichloroethene	70	70	BDL	154	128	10,000	BDL
Trichloroethylene	5	2.8	BDL	BDL	BDL	2,750	BDL

Notes:

BDL = Below Detection Limit
Shaded areas indicate non compliant concentrations

FIGURES

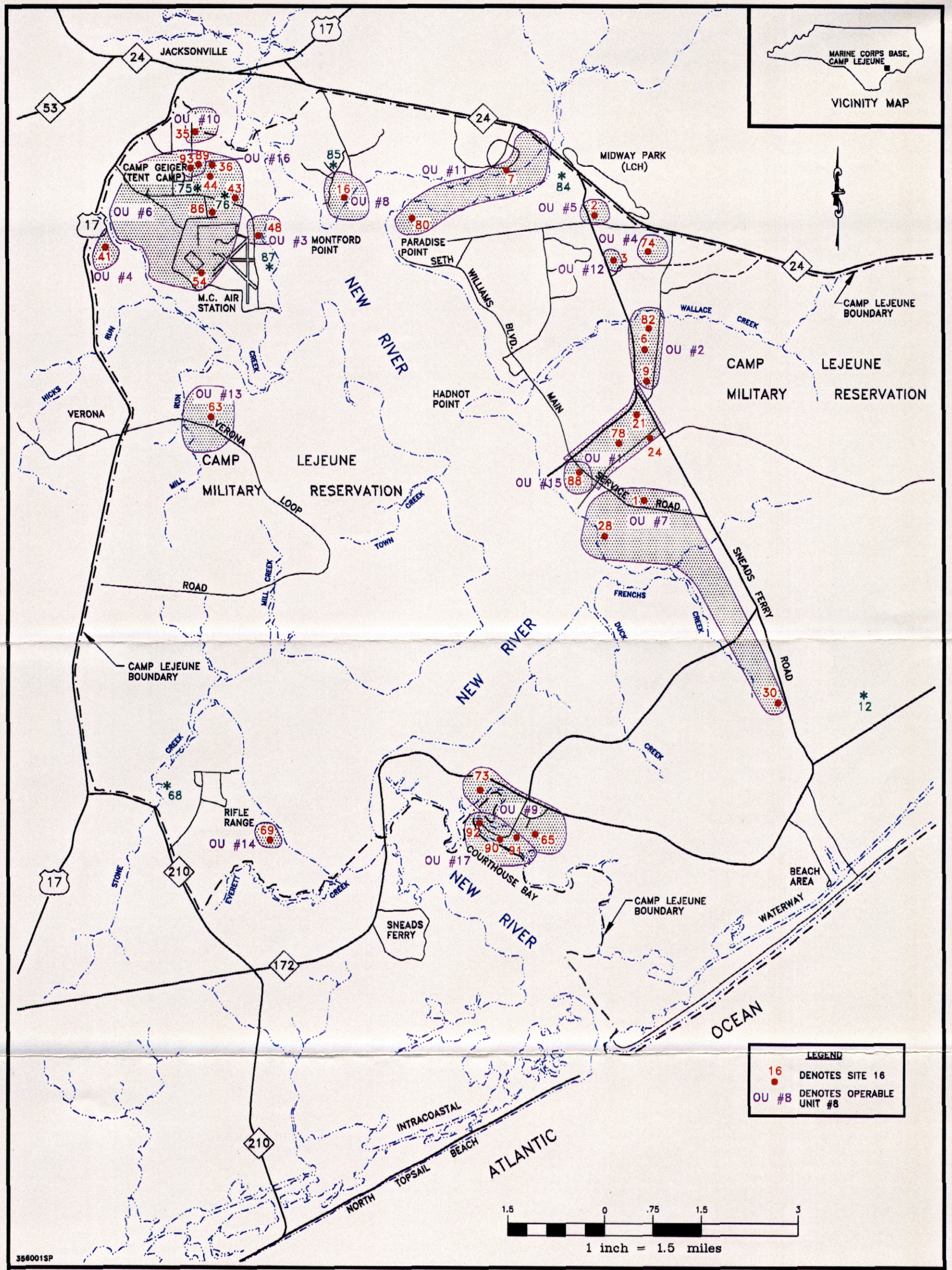
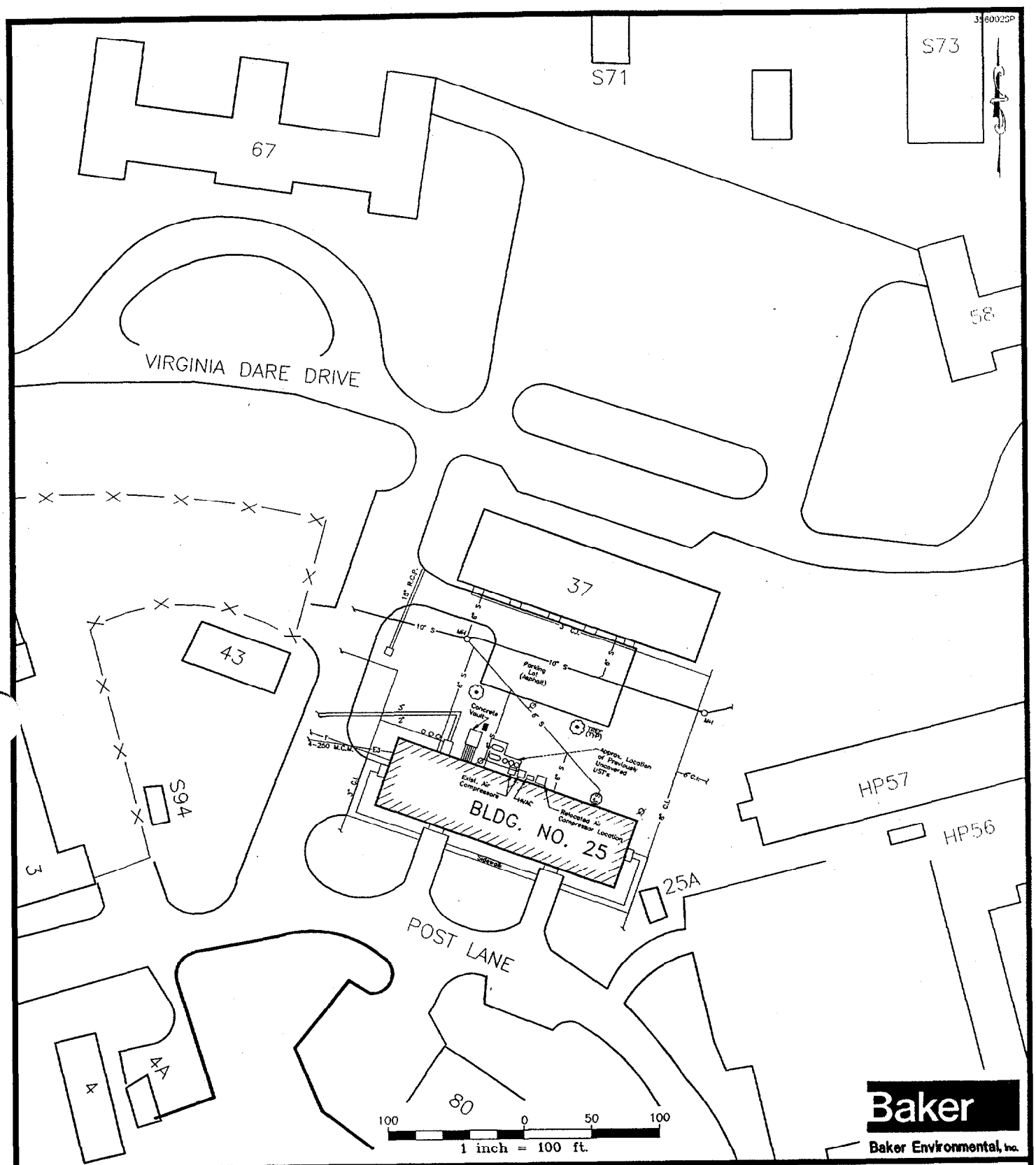


FIGURE 1–1
OPERABLE UNITS AND SITE LOCATIONS AT
MARINE CORPS BASE CAMP LEJEUNE
SAMPLE STRATEGY PLAN, CTO–0356

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

0230ROLY



LEGEND

BUILDING

FENCE

SOURCE: REVISED MCB CAMP LEJEUNE BASE MAP, 11/10/89

FIGURE 2-1
LOCATION MAP
SITE 88 (BUILDING 25)
SAMPLE STRATEGY PLAN, CTO-0356

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

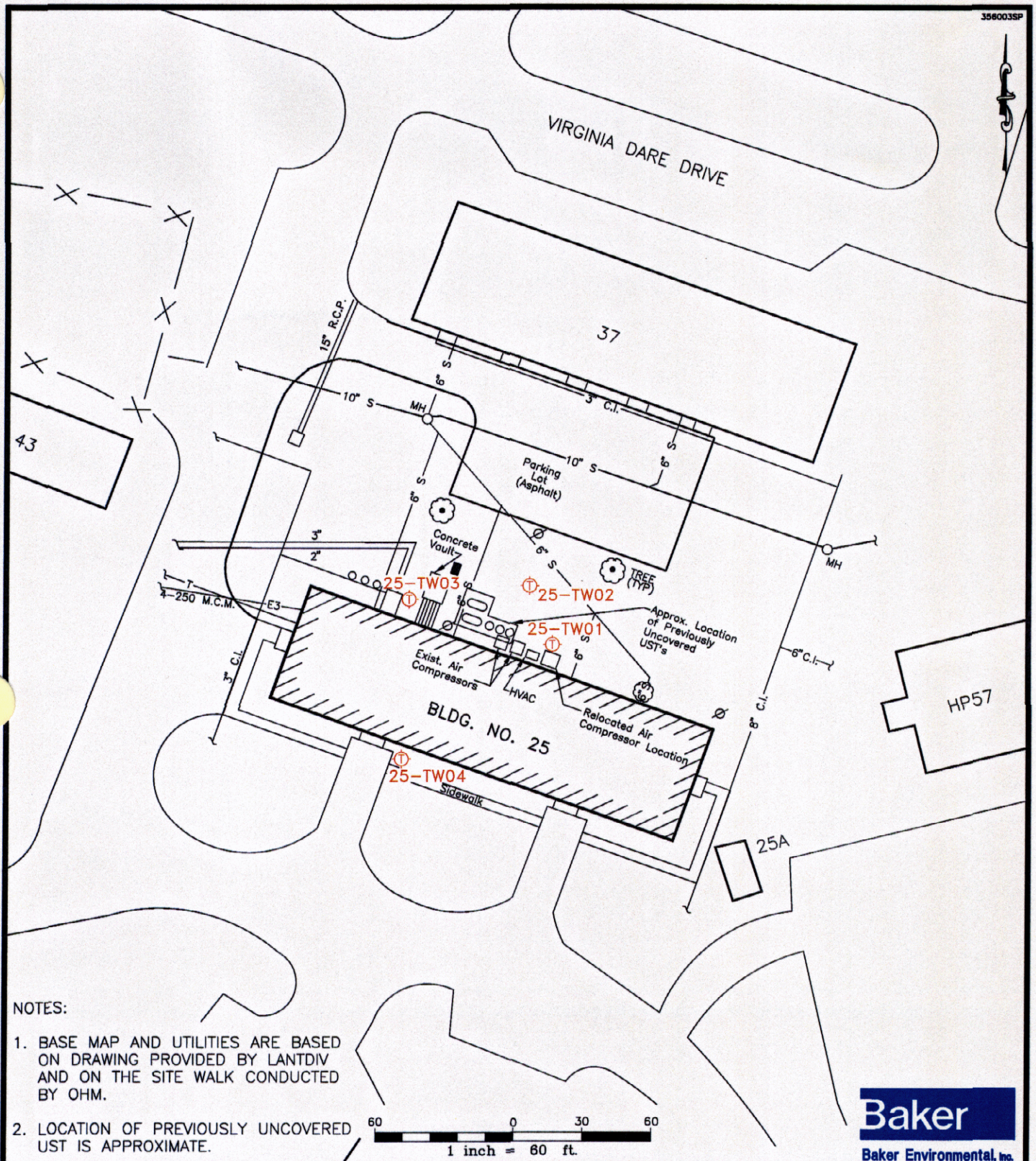
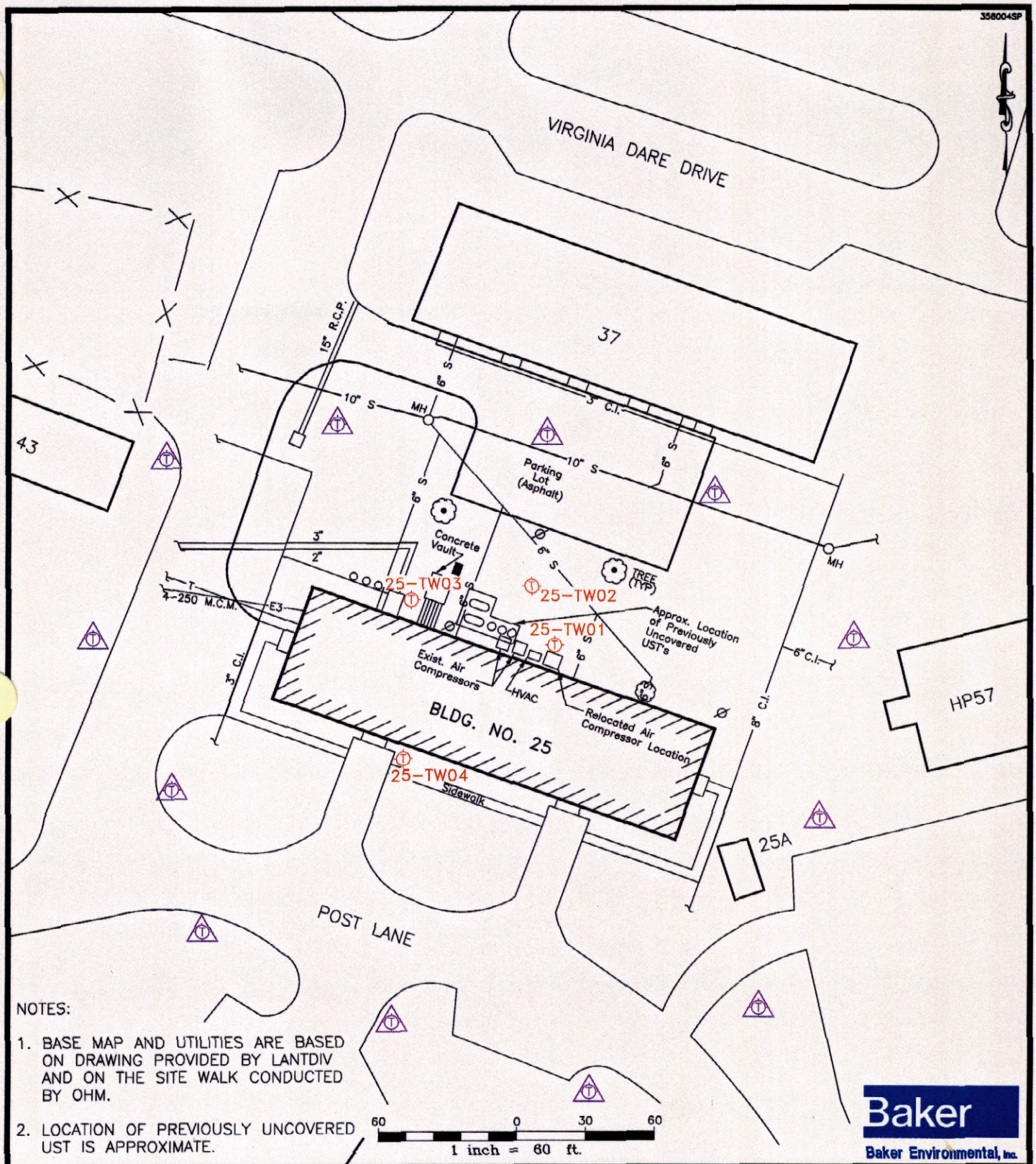


FIGURE 2-2
TEMPORARY MONITORING WELL LOCATIONS
SITE 88 (BUILDING 25)
SAMPLE STRATEGY PLAN, CTO-0356
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

02302P02Y



NOTES:

1. BASE MAP AND UTILITIES ARE BASED ON DRAWING PROVIDED BY LANTDIV AND ON THE SITE WALK CONDUCTED BY OHM.
2. LOCATION OF PREVIOUSLY UNCOVERED UST IS APPROXIMATE.

Baker
Baker Environmental, Inc.

LEGEND

- MH — MANHOLE
- DRAINAGE INLET
- 6" S — SEWERLINE
- 6" CI — CAST IRON PIPE
- 25-TW01 — TEMPORARY MONITORING WELL LOCATION
- TEMPORARY MONITORING WELL LOCATION
- BUILDING
- FENCE
- POWER POLE

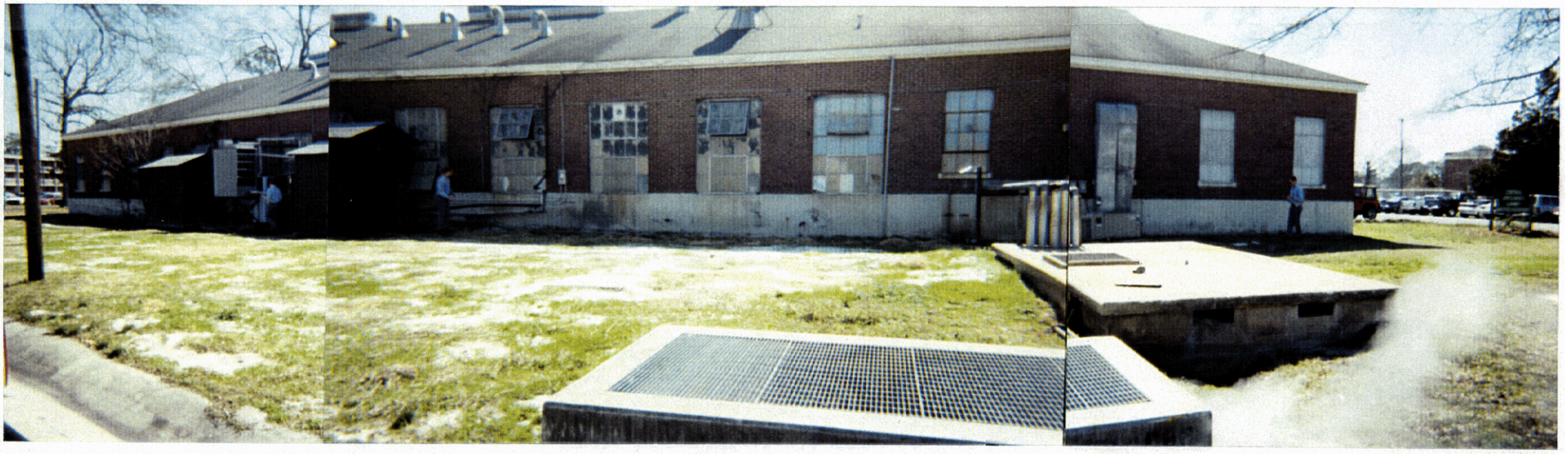
SOURCE: OHM REMEDIATION SERVICES CORP., 6/23/95

FIGURE 2-3
PROPOSED TEMPORARY MONITORING WELL LOCATIONS
SITE 88 (BUILDING 25)
SAMPLE STRATEGY PLAN, CTO-0356
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

02302P03Y

PHOTOGRAPHS

02302P04Y



Photograph 2-1: Site 88, UST excavation area and Building 25 looking South

Photograph 2-2: Inlet pipe from the old Varsol aboveground storage tank on the northern side of Building 25 looking South

Photograph 2-3: Southern side of Building 25 looking North

Photograph 2-4: Vicinity of Building 25 looking South

02302P05Y