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FREE PRODUCT REMOVAL TREATABILITY STUDY WORK PLAN FOR TRUMBO POINT BACHELOR OFFICER QUARTERS BUILDING C-2076 NAS KEY WEST FL

07/31/2008

TETRA TECH NUS

Comprehensive Long-term Environmental Action Navy

CONTRACT NUMBER N62467-04-D-0055

Rev. 0
07/31/08

Free Product Removal Treatability Study Work Plan for The Trumbo Point Bachelor Officer Quarters, Building C-2076

Naval Air Station Key West
Key West, Florida

Contract Task Order 0122

July 2008

Naval Facilities Engineering Command
Southeast
NAS Jacksonville
Jacksonville, Florida 32212-0030

TETRA TECH NUS, Inc.

Rev. 0
07/31/08

FREE PRODUCT REMOVAL TREATABILITY STUDY WORK PLAN

FOR

THE TRUMBO POINT BACHELOR OFFICER QUARTERS, BUILDING C-2076

NAVAL AIR STATION
KEY WEST, FLORIDA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Naval Facilities Engineering Command
Southeast
NAS Jacksonville
Jacksonville, FL 32212-0030

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CONTRACT NUMBER N62467-04-D-0055
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JULY 2008

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ACRONYMS AND ABBREVIATIONS

AC	Alternating Current
ACOE	Department of the Army, U.S. Army Corps of Engineers
AFVR	Aggressive Fluid Vapor Recovery
AST	Aboveground Storage Tank
BBL	Blasland, Bouck, and Lee
bls	below land surface
BOQ	Bachelor Officer Quarters
CLEAN	Comprehensive Long-Term Environmental Action, Navy
CTO	Contract Task Order
DC	Direct Current
DRF	Discharge Reporting Form
EDB	Ethylene Dibromide
EGIS	Environmental Geographic Information System
EPA	United States Environmental Protection Agency
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
GCTL	Groundwater Cleanup Target Level
HASP	Health and Safety Plan
IDW	Investigation-Derived Waste
IRA	Initial Remedial Action
MNA	Monitored Natural Attenuation
MSL	Mean Sea Level
µg/L	Micrograms per Liter
MW	Monitoring Well
NAS	Naval Air Station
NAVFAC SE	Naval Facilities Engineering Command Southeast
Navy	United States Navy
OVA	Organic Vapor Analyzer
PAH	Polynuclear Aromatic Hydrocarbon
PPM	Parts Per Million
PVC	Poly Vinyl Chloride
PWC	Public Works Center
QA/QC	Quality Assurance/Quality Control
RAP	Remedial Action Plan
SAR	Site Assessment Report

SCH	Schedule
SCTL	Soil Cleanup Target Level
SOP	Standard Operating Procedure
SVOA	Semi-Volatile Organic Compound
SVOC	Semi-Volatile Organic Compound
TtNUS	Tetra Tech NUS, Inc.
UST	Underground Storage Tank
VOA	Volatile Organic Aromatic
VOC	Volatile Organic Compound

1.0 INTRODUCTION

Tetra Tech NUS, Inc. (TtNUS) has been contracted by the Department of the Navy, Naval Facilities Engineering Command, Southeast (NAVFAC SE) to conduct a Treatability Study for recovery of free-phase petroleum product located in the subsurface formation behind Building C-2076, Trumbo Point Bachelor Officer Quarters (BOQ). This Treatability Study will evaluate the effectiveness of various technologies for the extraction of free product from the soils and groundwater beneath the Trumbo Point BOQ. This Work Plan was prepared under the Comprehensive Long-term Environmental Action Navy (CLEAN) IV Contract Number N62467-04-D-0055, Contract Task Order (CTO) number 0122.

1.1 SITE HISTORY

Building C-2076, the Trumbo Point BOQ, is located in Section 32, Township 67S, Range 25E as represented in Figure 1-1. The site is near the intersection of Chevalier Avenue and Ely Street and encompasses much of the paved loading dock area south of the west wing of the BOQ building. The site topography is level and the elevation of the site is approximately 5 feet above mean sea level (MSL). The site is bounded on the north by Towers Avenue, on the east by Chambers Street, on the south by Chevalier Avenue, and on the west by Building C-2078, Building C-2081, and Ely Street. Within one-quarter-mile radius of the site are the Gulf of Mexico to the north and Garrison Bight to the east.

A 1,000-gallon JP-5 above ground storage tank (AST) with secondary containment is on site, and is used to fuel the BOQ water heaters. An above ground propane tank is located southwest of the site. An underground free-phase petroleum plume was discovered near a water line and valve pit adjacent to the current AST location. The release was reported to have emanated from an abandoned fuel line that was associated with a 100-gallon AST, formerly located on the southern portion of the site. A portion of this fuel line was located near the water valve pit; however, the exact location of the entire abandoned line is not known (BBL, 2000c, 2002).

The Navy discovered free petroleum product at the site on February 27, 1998, during a routine inspection of a water line valve pit [Public Works Center (PWC), 1999]. Consequently, the Public Works Department of NAS Key West submitted a Discharge Reporting Form (DRF) to the Florida Department of Environmental Protection (FDEP) on March 3, 1998. The estimated quantity of discharged free-phase product was reported as less than 5 gallons. A second DRF was filed for the site on March 11, 1998, after a failure was observed during a pressure test that was performed on the underground piping from the 100-gallon AST. The DRF indicated the cause of the release as corroded piping and the product discharged as JP-5 jet fuel. The failure of an active product line to pass a pressure test resulted in the line being abandoned (BBL, 2002).

During source removal activities performed in March 1998, approximately 55 cubic yards of contaminated soil and approximately 10 gallons of free product were removed in the vicinity of the valve pit. The location of this excavation was south of the loading dock in the area of abandoned monitoring wells MW-X1 and MW-4 (Figure 1-2). Due to the proximity of the BOQ building and an active propane gas supply line, the excavation of the entire extent of impacted soils was not possible. A Source Removal Report was submitted to the FDEP by the Navy on October 14, 1998.

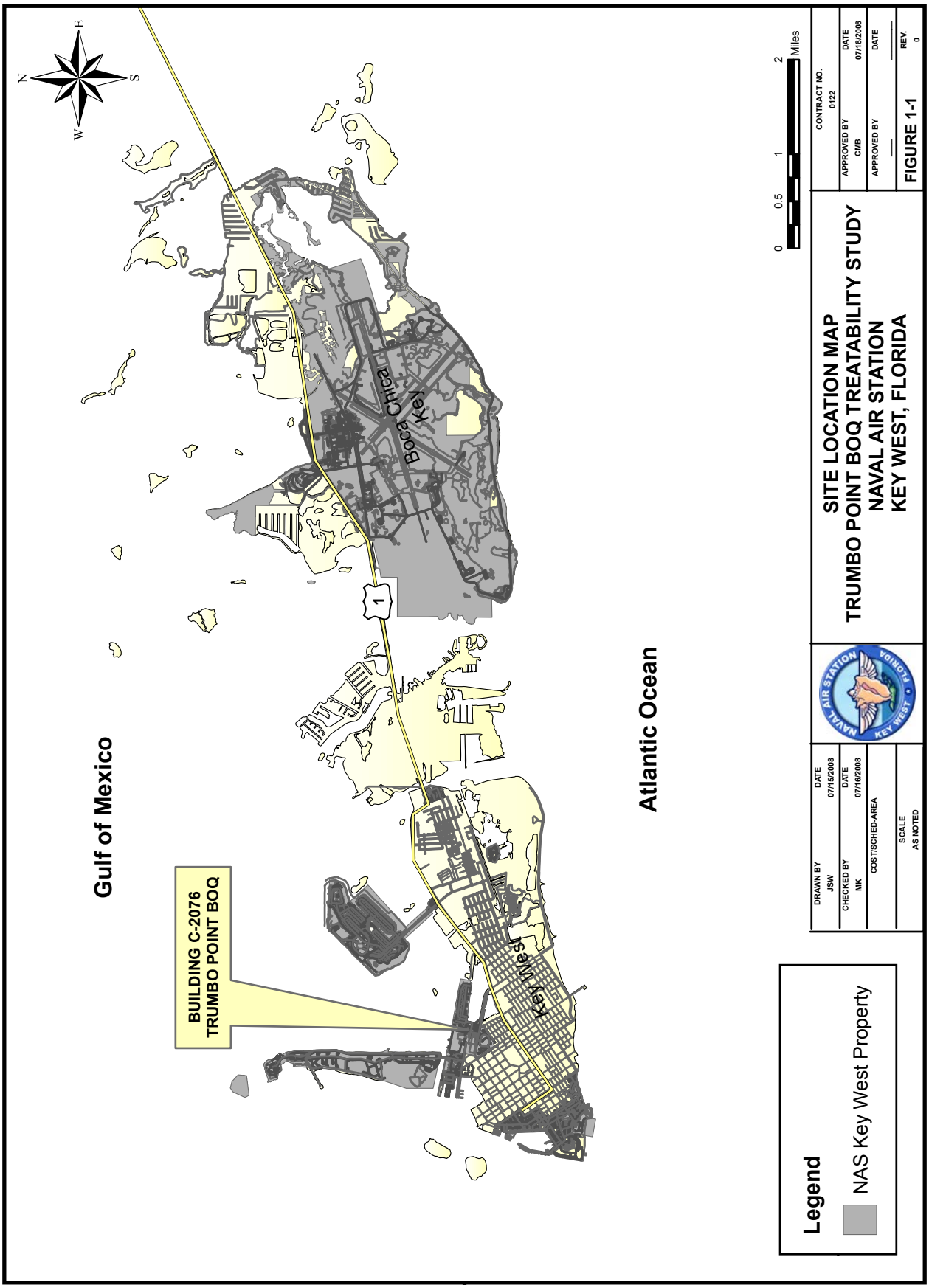
A site assessment was conducted by PWC Pensacola and a Site Assessment Report (SAR) was submitted to FDEP (PWC, 1999). This SAR concluded diesel fuel free product probably remained on site, and the dissolved-phase groundwater petroleum hydrocarbon concentrations exceeded the groundwater cleanup target levels (GCTLs). Soil contamination exceeding the soil cleanup target levels (SCTLs) specified in Chapter 62-777, FAC for both the Residential Use Direct Exposure and Commercial/Industrial Use Direct Exposure were present. The SAR documented that on site soil analyses with an organic vapor analyzer (OVA) indicated that readings in excess of exceeded 1,000 parts per million (ppm) were recorded. FDEP approved the SAR on July 9, 1999, concurring with the recommendation to prepare a Remedial Action Plan (RAP) for the site.

The Navy contracted to have a RAP prepared for the site (BBL, 2002), which recommended conducting several short-term multi-phase extraction events until free product was no longer present in any of the monitoring wells. Multiphase extraction technology proved to be ineffective, however, due to the low transmissivity of the subsurface formations.

In May 2003, a sampling event was performed to determine the level of contamination in the wells. Several VOCs and SVOCs were detected in the samples; however, only benzene, acenaphthene and naphthalene were detected above GCTLs. In addition, free product was observed only in MW-15, at approximately 0.5 feet in thickness.

1.2 SCOPE OF WORK

Free product extraction tests will be performed at Building C-2076, Trumbo Point BOQ site to characterize the thickness of the free product layer and help determine the recovery potential of free product from the surficial aquifer. MW-15 is planned to be used as the free product recovery well and five recovery technologies will be considered during this treatability study. The effectiveness of each technology will be evaluated in a treatability study evaluation report. Free product and groundwater levels will be measured at the recovery well during each recovery event. If free product is present in the well, removal and transfer procedures will be performed, and waste will be collected for disposal.


N
E
S
W
Gulf of Mexico
BUILDING C-2076
TRUMBO POINT BOQ
Boca Chica Key
1
Key West
Atlantic Ocean
0
0.5
1
2
Miles
Legend
NAS Key West Property
DRAWN BY
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DATE
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CHECKED BY
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DATE
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COST/SCHED-AREA
SCALE
AS NOTED
NAVAL AIR STATION
KEY WEST
FLORIDA
SITE LOCATION MAP
TRUMBO POINT BOQ TREATABILITY STUDY
NAVAL AIR STATION
KEY WEST, FLORIDA
CONTRACT NO.
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FIGURE 1-1
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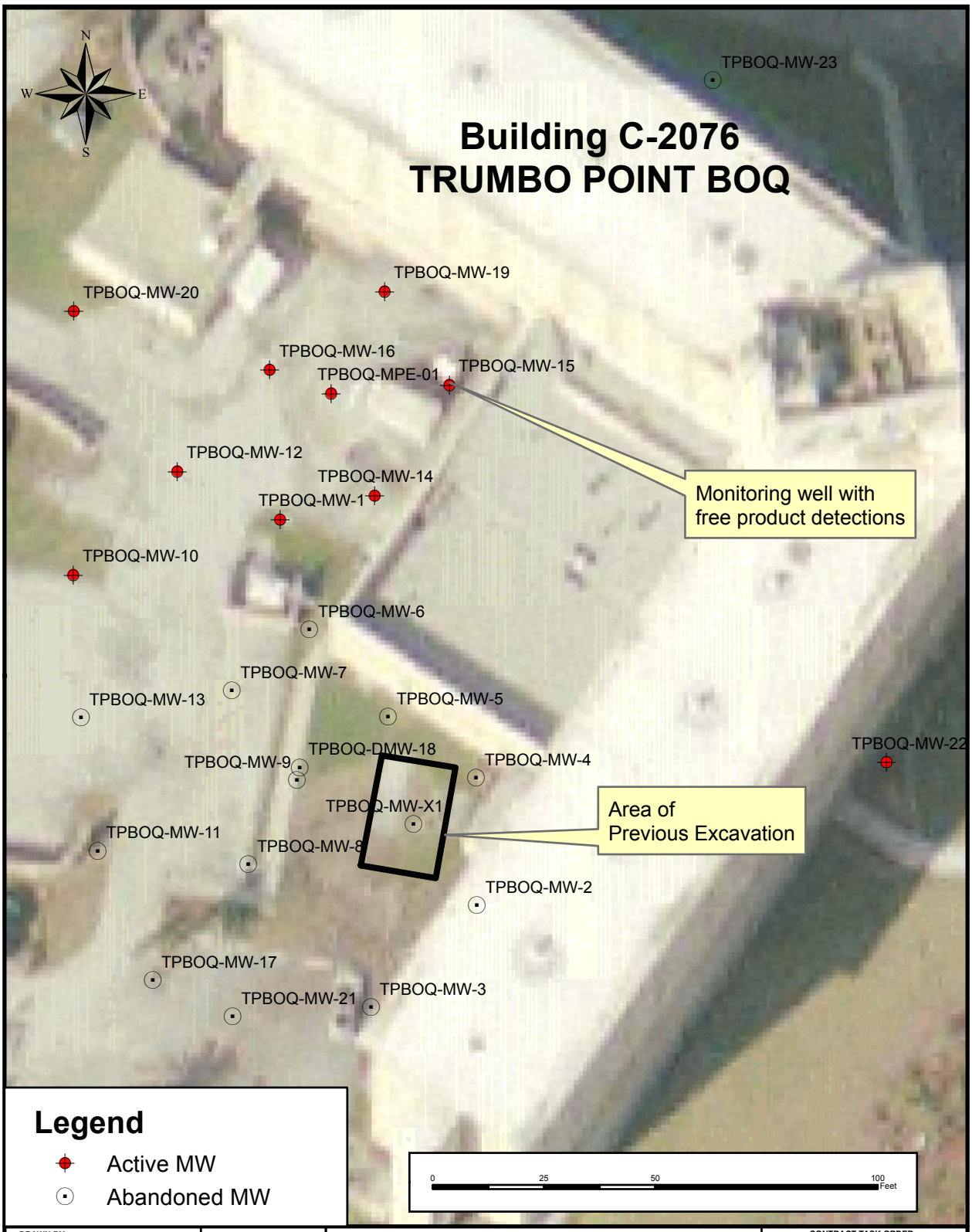


DRAWN BY JSW	DATE 07/17/2008	TRUMBO POINT BOQ TREATABILITY STUDY AREA OF REMOVAL/EXCAVATION NAVAL AIR STATION KEY WEST, FLORIDA	CONTRACT TASK ORDER 0122
CHECKED BY MK	DATE 07/24/2008		APPROVED BY CMB / DATE 07/28/2008
COST/SCHED-AREA			APPROVED BY ___ / DATE ___
SCALE AS NOTED			FIGURE NO. 1-2 / REV. 0

2.0 TREATABILITY STUDY CONCEPT AND OPERATION

A RAP for the Trumbo Point BOQ site was drafted in 2002 based on the data from investigations performed by PWC Pensacola and BB&L. The RAP called for free product removal using aggressive fluid vapor removal (AFVR) technology. It has since been determined, however, that AFVR is not an effective means of free product removal at the Trumbo Point BOQ site because of an unyielding condition of the subsurface materials throughout Trumbo Point and most particularly around Building C-2076. The highly-compacted clay material in the study area significantly slows the recovery of free product in the subsurface strata. Consequently, TtNUS is tasked with completing a treatability study for evaluating free product recovery rates from MW-15.

Recent investigations indicate MW-15 as the only monitoring well with a detectable amount of free product at the Trumbo Point BOQ site. Consequently, MW-15 will be used as a recovery well for this treatability study. The location of the free product recovery well is near the northwest corner of the loading dock as presented in Figure 2-1.

2.1 TREATABILITY STUDY OBJECTIVE

The objective of this treatability study is to perform passive free product recovery on the former monitoring well MW-15 at Trumbo Point BOQ. The study is scheduled to be at least 6 months in duration and involve up to five different recovery technologies. During the treatment study, three manual recovery technologies and two automated recovery technologies will be considered for effective free product removal. The three manual technologies include:

- Manual recovery and disposable tube and check-valve type bailer.
- Peristaltic pump with rotational pinch rollers and disposable silicone tubing.
- The Spill Buddy™ system; a portable reel-operated assembly system manufactured by Clean Earth Technology. This system includes a pump that is mounted on a reel which is connected to an intake and detection probe that is adjusted manually through audible feedback.

The automated control operated extraction systems are:

- Down-hole free product skimmer pump with activation and shutoff controls of the component type manufactured by Xitech Instruments.

- Automated reel mounted free-phase petroleum pumping system such as the Magnum Spill Buster™ systems manufactured by Clean Earth Technology. On this type of reel assembly, a motor operates to automatically adjust the depth of the intake pump and probe to the oil and water interface.

The field trials of these five recovery technologies will provide the basis for the selection of the control technology most appropriate for the specific conditions present at the Trumbo Point BOQ.

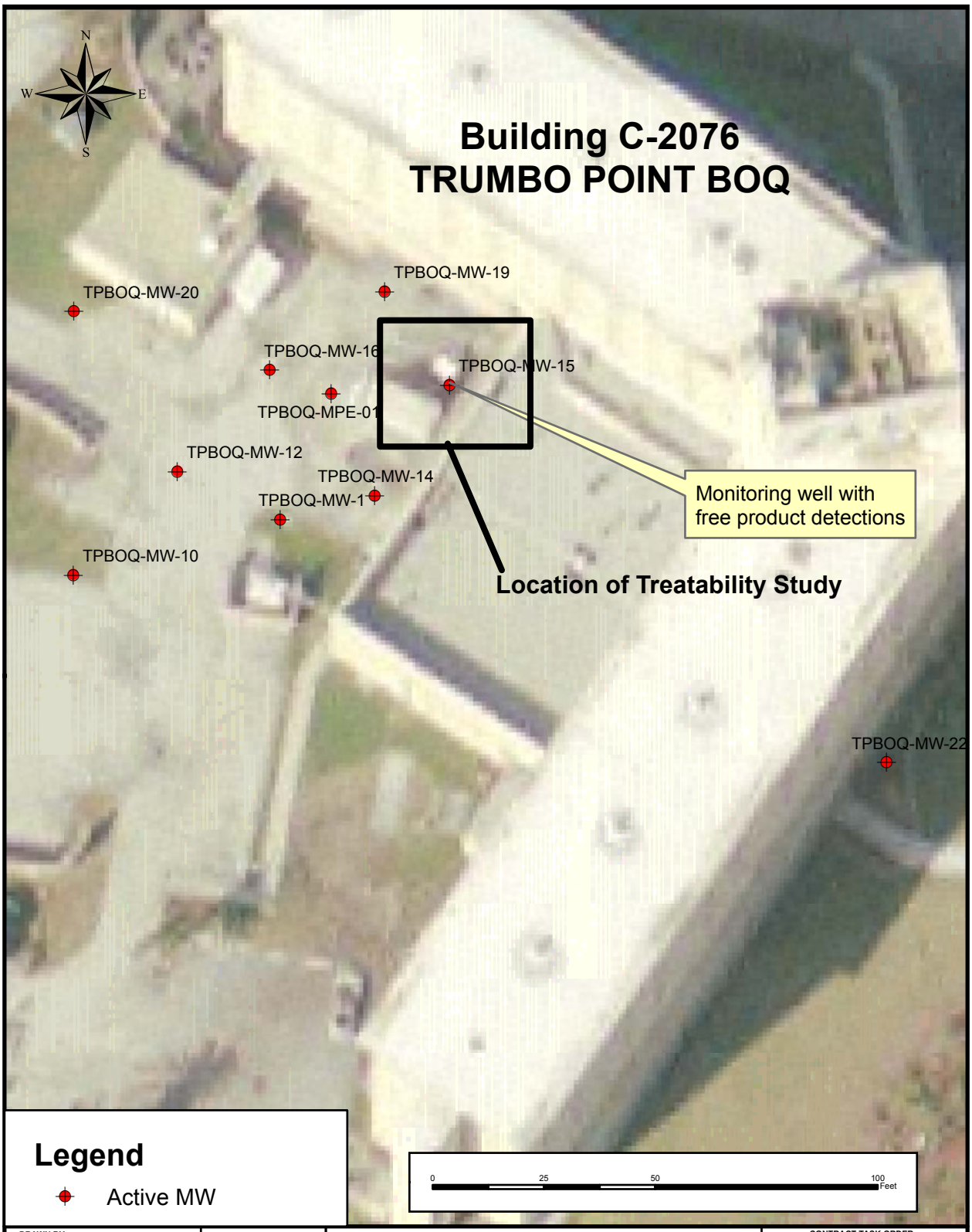
2.2 TREATABILITY STUDY CONCEPTUAL MODEL AND APPROACH

The most efficient way to remove subsurface free-phase petroleum product is by direct extraction of the contaminant itself, providing that it can be recovered with a reasonable amount of effort (ACOE 1999). Recovery rates normally depend on the ability of the subsurface formation to transmit free product. Two means of direct extraction of free-phase product are submersible pumps and skimmer pumps. While skimmer pumps generally extract free product only, submersible pumps remove both groundwater and free product. When there is a thicker layer of free product in the recovery well being released slowly by the subsurface formation, skimmer pumps have the advantage of producing less waste. When a thinner layer exists and the subsurface formations are more porous, submersible pumps are advantageous because they remove both free product and contaminated water from the recovery wells.

Due to the greater thickness of free-phase product layer typically found in the MW-15, and the relatively unyielding condition of the subsurface formation, skimmer pumps are expected to be the most effective recovery technology. This study will consider the operational efficiency of two automated skimmer type recovery systems. Once a technology has been evaluated and selected, remediation of the free product will be performed for at least one month or until there is an absence of free product in the recovery well. TtNUS will work with the appropriate personnel from Navy (as the property owners), Morale Welfare and Recreation (a tenant organization in Building C-2076), and Navy Gateway Inns and Suites (operators of Building C-2076) to ensure ongoing activities at Building C-2076 are minimally affected while performing the treatability study.

2.3 INVESTIGATION-DERIVED WASTE (IDW) HANDLING

Free Product, groundwater, purge water, and decontamination water will be containerized in drums and labeled, at a minimum, with the following: contents, date, source and NAS Key West generator number (FL 6170022952). All IDW will be handled in accordance with the United States Environmental Protection Agency (EPA) guidance document “Management of Investigation-Derived Wastes During Site Inspections”, (EPA, 1991). TtNUS will manage and dispose of all IDW produced.



DRAWN BY JSW	DATE 07/17/2008	TRUMBO POINT BOQ TREATABILITY STUDY LOCATION OF TREATABILITY STUDY NAVAL AIR STATION KEY WEST, FLORIDA	CONTRACT TASK ORDER 0122
CHECKED BY MK	DATE 07/24/2008		APPROVED BY CMB / DATE 07/28/2008
COST/SCHED-AREA			APPROVED BY ___ / DATE ___
SCALE AS NOTED			FIGURE NO. 2-1 / REV. 0

3.0 TREATABILITY STUDY IMPLEMENTATION AND RESULTS

3.1 TREATABILITY SYSTEM INSTALLATION

The three manual free product extraction technologies that will be employed include the bailer, the peristaltic pump, and the Spill Buddy™ system. Equipment needed for these technologies may either be stored on site within the recovery well or may be removed upon completion of the recovery event for storage or disposal as IDW. The peristaltic pump and Spill Buddy™ system are powered by portable means (automobile or battery power) and will be removed from the site after the recovery event has been completed. Peristaltic pump tubing and bailers may be stored on in site within the recovery well, providing they are in operable condition. The Spill Buddy™, Spill Buster™, and Xitech skimmer pump will be removed and decontaminated after each daily event. Disposable bailers will be disposed in the trash after the completion of each extraction event.

The two automated recovery technologies require mounting to the well. The Xitech skimmer pump is powered by either 110 volt alternating current (AC) or by compressed air. The entire system may be left on site or removed after the recovery event has been completed. The Magnum Spill Buster™ requires either 110-volt AC or 24-volt (two car batteries, for example) battery power and is mounted to the well and to a control support. The Magnum Spill Buster™ can be left on site or disassembled and removed after each free product recovery event.

3.2 TREATABILITY SYSTEM OPERATION AND MAINTENANCE

System parameters and recovery efficiency will be collected at each recovery event. Recovery transmission conduits, remote sensing equipment, and control instrumentation will be maintained, cleaned and repaired as required according to the manufacturer's specifications. The duration of the trials for each technology will be approximately one month.

Technology trial times are subject to the presence of free-phase product in the recovery well and to the approval of Navy facilities personnel. Additional criteria that will influence the duration of technologies trial period include: recovery effectiveness, suitability for the target application, and operational constraints. The recovery well is located in an active loading dock that sustains (continuous and at times) heavy traffic. The two automated recovery units are designed to be left in place; however, traffic loading around the recovery well may be incompatible with these types of installations. Based on the variability in the technologies' trial times, there may not be sufficient time during the treatability study to implement all of the intended technologies. Consequently, one or more of the technologies outlined in Section 2.1 may be omitted from the treatability study. It is expected that the two manual technologies; hand bailing and peristaltic pumping will be implemented at the beginning of the study to provide a baseline for the more sophisticated technologies.

Contaminated equipment and instruments will be decontaminated at the site before they are transported. Contaminated disposable equipment and supplies will be containerized, stored, and disposed as IDW at the end or their use.

3.3 TREATABILITY SYSTEM PERFORMANCE

The performance of free product extraction technologies will be monitored by the collection of parameters including: water depth, free product depth, and the volume of free product extracted from the well. Measurements made during each recovery event will be used as a basis for determining both the effectiveness of the recovery technology and transmission of free product through the subsurface formations. Performance of the free-phase product recovery technologies will be evaluated with the criteria presented on Table 3-1.

3.4 TREATABILITY STUDY REPORTING

A Treatability Study Evaluation Report documenting the treatability study activities will be prepared following the completion of treatment study. Parameters such as product recovery volumes and rates, product and groundwater levels in the recovery well and recovered product disposal activities will be presented. The Treatability Study Evaluation Report will detail and evaluate the relative effectiveness of the selected treatment technologies and draw conclusions as to the feasibility of implementing a free product recovery system at Trumbo Point BOQ. Appropriate conclusions and recommendations will also be presented that pertain to the results of the treatability study.

TABLE 3-1

**TREATABILITY STUDY OPERATIONAL PARAMETERS
TRUMBO POINT BOQ, NAVAL AIR STATION
KEY WEST, FLORIDA**

	Free Product Thickness	Depth to Water	Depth to Free Product	Event Duration Period (Hours)	Rate of Groundwater Production Within Well	Rate of Free Product Recovery	Overall Efficiency of Technology
Manual Bailer	X	X	X	X	X	X	X
Peristaltic Pump	X	X	X	X	X	X	X
Clean Earth Automated - Spill Buddy Pro	X	X	X	X	X	X	X
Xitech Automated - Skimmer & Control	X	X	X	X		X	X
Clean Earth Automated - Magnum Spill Buster	X	X	X	X		X	X

4.0 COMPARISON OF FREE PRODUCT TO DISSOLVED-PHASE CONTAMINATION DISTRIBUTIONS

In a review of the site assessment activities for the Trumbo Point BOQ for the past 10 years, it appears that the petroleum plume may have migrated north of where it was originally discovered. An analysis of the naphthalene detections for the 10-year period 1998 through 2008 indicates a reduction in the dissolved-phase contaminant concentrations.

4.1 HISTORICAL GROUND WATER SAMPLING EVENTS

As described in the 1999 SAR, the center of the petroleum plume was estimated to be located south of the loading dock and west of the propane tank. No free-phase product was detected in the monitoring wells west of the loading dock or adjacent to Building 2081. According to the 1999 SAR, the 1998 and 1999 sampling events did not detect dissolved-phase petroleum constituents in monitoring wells south of MW-1 and east of MW-13. Although delineation sampling was performed north of the predicted plume center, delineation was not performed for the eastern extent of the plume because this area is obstructed by Building C-2076.

Free-phase product was detected in three monitoring wells to the west of the building loading dock (MW-14, MW-15, and MW-16) during baseline sampling in 2000. Results of the March 2000 sampling event indicated that the dissolved-phase plume was centered near monitoring well MW-14. In the two most recent monitoring events, performed in 2003 and 2006, the dissolved-phase plume was presumed to be centered near monitoring wells MW-6 and MW-7, and free-phase product was reported in MW-15. The results of the four historical monitoring events are summarized in Figure 4-1. The separation of the free-phase product and the dissolved-phase contaminant plumes indicates a possibility the two plumes are not related. Previous sampling at the BOQ site, however, has not included any type of “fingerprint” analyses of the free-phase product plume to provide data supporting or refuting the relationship between the two plumes.

4.2 WELL INSTALATION AND LOCATIONS

Eleven monitoring wells south of the loading dock (MW-X1, MW-2, MW-4 through MW-9, MW-11, MW-13 and MW-18) have been abandoned. Six replacement wells will be constructed and developed to replace the abandoned wells. These six replacement wells will be sited both within and around the perimeter of the most recent inferred plume location. The locations of the proposed replacement wells are presented in Figure 4-2.

The six proposed replacement wells will consist of five shallow wells with depths of 12 feet and one deep well with a depth of 30 feet below land surface (bls). The shallow wells will be constructed with screens

from two to 12 feet bls and be of 2-inch diameter, schedule (SCH) 40 Polyvinyl Chloride (PVC) 0.010" screen. Screens will be flush threaded to 2 feet of 2-inch diameter SCH 40 PVC casing for a total depth of 12 feet bls. The annulus will be filled with 20/30 silica sand at the 10-foot screen zone, and then grouted to the surface. The well will be finished at the surface with an 8" manhole casting set in a 2 foot x 2 foot concrete pad. The deep well will be constructed with a screen from 25 to 30 feet bls and include 2-inch diameter, schedule SCH 40 PVC 0.010" screen. Screens will be flush threaded to 25 feet of 2-inch diameter SCH 40 PVC casing for a total depth of 30 feet bls. The annulus will be filled with 20/30 silica sand at the five foot screen zone, and then grouted to the surface. The deep well will have an additional two feet of fine sand filter pack from the top of the screen zone, or from 25 to 23 feet bls. The well will be finished at the surface with an 8" manhole casting set in a 2 foot x 2 foot concrete pad. Construction details for the proposed replacement monitoring wells are provided in Figure 4-3.

4.3 SAMPLING PROCEDURES

Groundwater sampling will occur following the construction and development of the replacement monitoring wells. The sampling will be performed in accordance with FDEP standard operating procedure (SOP) 001/01 FS 2200: Groundwater Sampling. One groundwater sample will be collected from each new monitoring well and three existing wells MW-1, MW-14, and MPE-01. Samples collected from these wells will be submitted to a fixed-base laboratory for analyses as outlined in Table 4-1. In addition to samples from the six replacement wells and three existing wells, a sample from the free-phase product from MW-15 will be obtained. The existing monitoring wells MW-1, MW-14, and MPE-01 were chosen due to their proximity to the historical inferred plume locations. These three existing monitoring wells are in the predicted direction of plume travel from the spill origin to the free-phase product recovery well. They are also areas where dissolved-phase petroleum hydrocarbons have been detected.

The purpose of obtaining this sample of the free-phase product is to attempt to identify the nature of the petroleum product (a "fingerprint analysis") and compare it to the chemicals detected in the dissolved-phase contaminant plume to establish weather a correlation between the free-phase product plume and the dissolved-phase contaminant plume exists. In the event that such a correlation exists, it would indicate that both free-phase and dissolved-phase petroleum contamination originated from the same source.

4.4 GROUNDWATER SAMPLE IDENTIFICATION

A sample tracking number uniquely identifying each sample and consisting of a five- to six-segment alphanumeric code that identifies the site designation, sample medium, data type, location, the sampling event and the quality control (QC) designation will be created to uniquely identify each sample. The QC designation will only be used if the sample is intended to be used for QC purposes. Any other pertinent information regarding sample identification will be recorded in the field logbook.

The alphanumeric coding to be used in the sample system and examples of possible sample identification numbers follow:

NNNNN	-	Site Number
A	-	Medium
AANN	-	Location
NN	-	Sampling Event
AAA(A)	-	QC Designation (if applicable)

Character Type:

A = Alpha

N = Numeric

Medium:

G = Groundwater	A = Air
W = Surface Water	E = Effluent
S = Soil	D = Sediment
E = Equipment Rinsate	F = Field Blank
T = Trip Blank	X = Other

QC Identifier:

D = Duplicate Sample

M = Matrix Spike Sample

S = Matrix Spike Duplicate

Example 1: The analytical groundwater sample collected from monitoring well MW-2 at the Trumbo Point BOQ during the Treatability Study sampling event would be called TPBOQGMW02TS.

Example 2: The analytical groundwater sample and matrix spike collected from monitoring well MPE-01 at the Trumbo Point BOQ during the Treatability Study sampling event would be called TPBOQGMP01TS and TPBOQGMP01TSM.

Example 3: The analytical trip blank for the Trumbo Point BOQ during the Treatability Study would be called TPBOQGT001TS; the second trip blank during the same event would be TPBOQGT002TS.

4.5 REPORTING

Laboratory analytical data will undergo TtNUS's rigorous quality assurance (QA) review. Results from the Free Phase Petroleum Product Removal Treatability Study sampling will be reported with the Treatability Study Evaluation Report to be submitted to the Navy and the FDEP. Analytical results will be compared

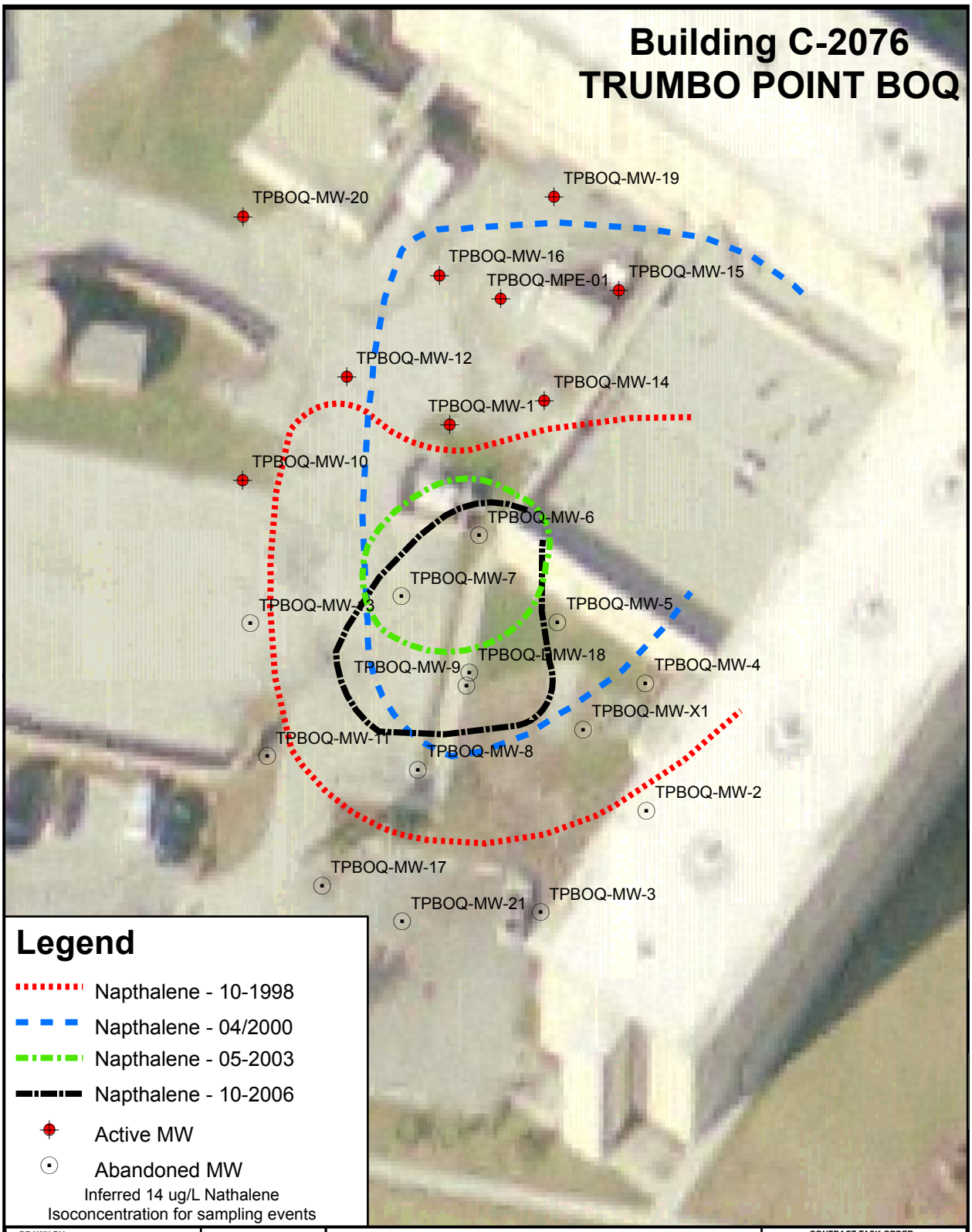
to FDEP GCTLs. The report will include a summary of work performed, sampling results, and recommendations. The report will be prepared in final form only.

TABLE 4-1

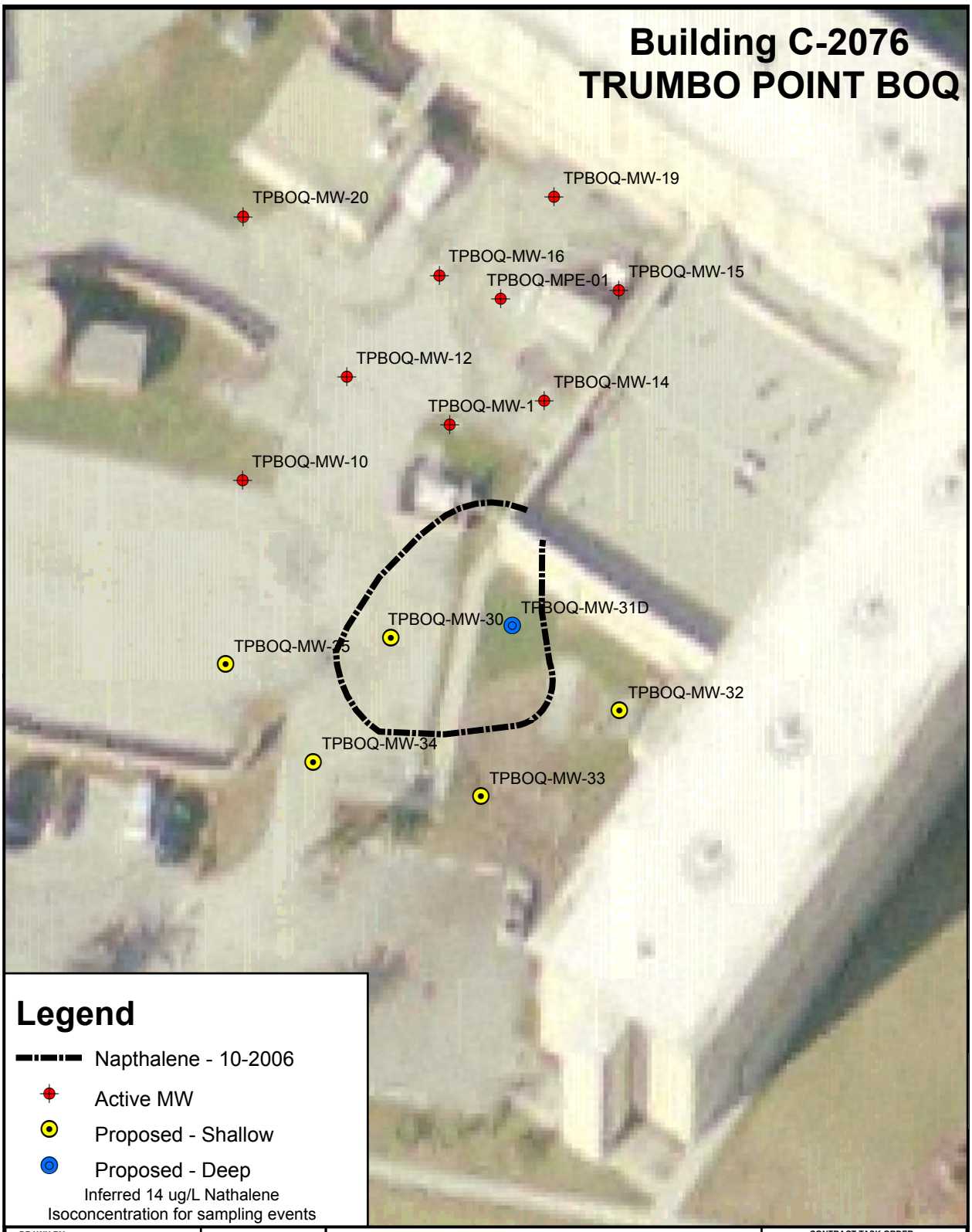
GROUNDWATER SAMPLE PROTOCAL FOR THE TREATABILITY STUDY FOR THE BACHLORS OFFICERS QUARTERS NAVAL AIR STATION KEY WEST, FLORIDA

Monitor Well	VOAs(1)	PAHs(2)	TRPH(3)	Lead(4)	Total Iron(5)	EDB(6)
TPBOQ-MW-1	1	1	1	1	1	1
TPBOQ-MW-14	1	1	1	1	1	1
TPBOQ-MPE-01	1	1	1	1	1	1
TPBOQ-MW-30	1	1	1	1	1	1
TPBOQ-DMW-31	1	1	1	1	1	1
TPBOQ-MW-32	1	1	1	1	1	1
TPBOQ-MW-33	1	1	1	1	1	1
TPBOQ-MW-34	1	1	1	1	1	1
TPBOQ-MW-35	1	1	1	1	1	1
Duplicate	1	1	1	1	1	1
Trip Blank	6	0	0	0	0	0
Equip. Blank	2	2	2	2	2	2

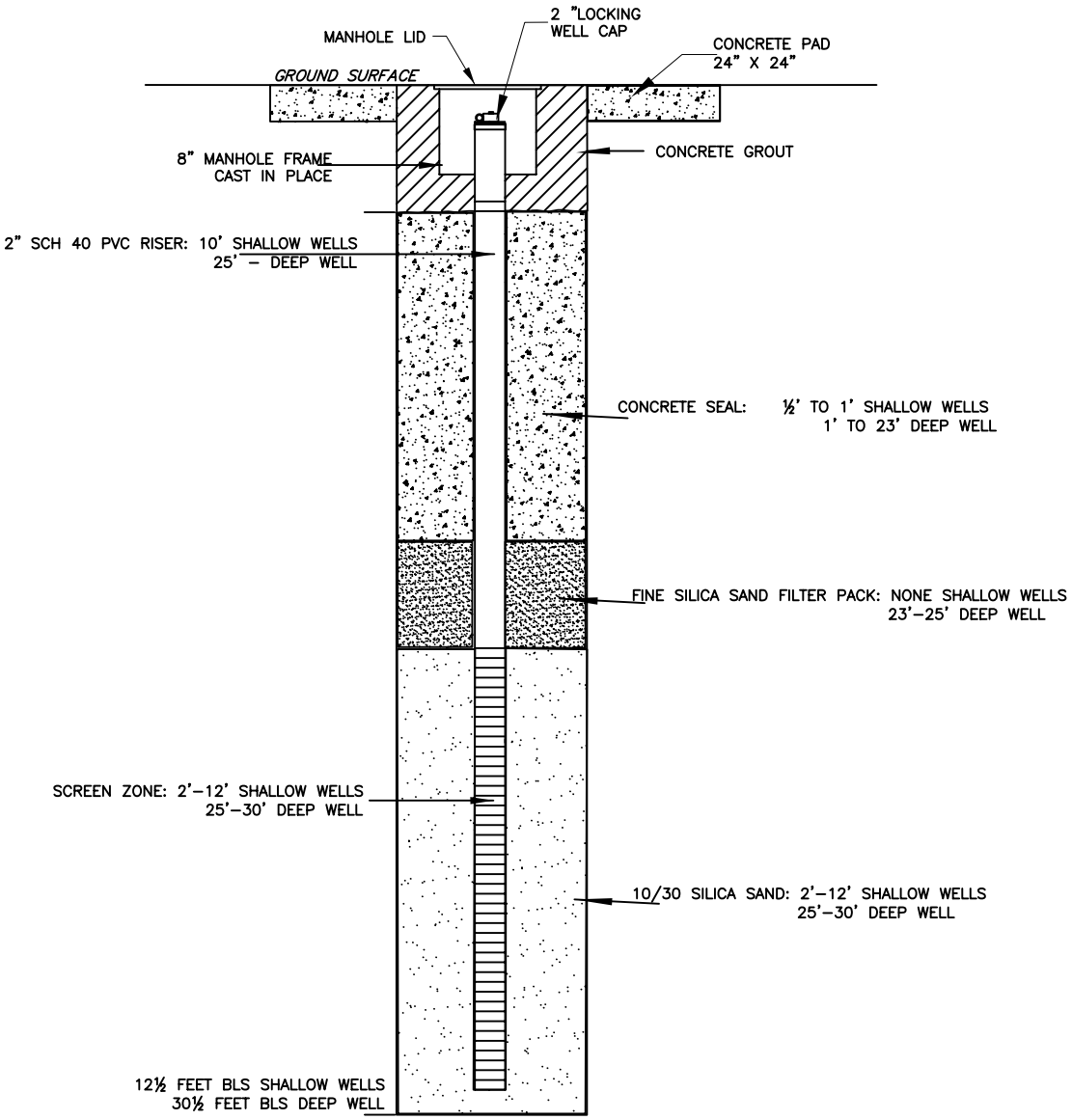
(1) Volatile Organic Aromatics – benzene, toluene, ethylbenzene, total xylenes and methyl tert-butyl ether using SW-846 5030B/8260.
(2) Polynuclear Aromatic Hydrocarbons using Method 8270C SIM
(3) Total Recoverable Petroleum Hydrocarbons, using Florida Petroleum Range Organics (FL-PRO)
(4) EPA method 239.2
(5) SW846/ 6010B.
(6) Ethylene dibromide using EPA Method 504.1



DRAWN BY JSW	DATE 07/17/2008	TRUMBO POINT BOQ TREATABILITY STUDY NAPTHALENE CONCENTRATIONS NAVAL AIR STATION KEY WEST, FLORIDA	CONTRACT TASK ORDER 0122
CHECKED BY MK	DATE 07/24/2008		APPROVED BY CMB / DATE 07/28/2008
COST/SCHED-AREA			APPROVED BY ___ / DATE ___
SCALE AS NOTED			FIGURE NO. 4-1 / REV. 0



DRAWN BY JSW	DATE 07/17/2008	TRUMBO POINT BOQ TREATABILITY STUDY PROPOSED MONITORING WELL LOCATIONS NAVAL AIR STATION KEY WEST, FLORIDA	CONTRACT TASK ORDER 0122
CHECKED BY MK	DATE 07/24/2008		APPROVED BY CMB / DATE 07/28/2008
COST/SCHED-AREA			APPROVED BY ___ / DATE ___
SCALE AS NOTED			FIGURE NO. 4-2 / REV. 0



MONITORING WELL DETAIL

REVISIONS	DRAWN BY MK DATE 07/23/08		MONITORING WELL DETAIL TRUMBO POINT BOQ FREE PRODUCT RECOVERY TREATABILITY STUDY, NAS KEY WEST, FLORIDA	CONTRACT NO. 0122	
	CHECKED BY DATE			APPROVED BY CMB DATE	
	REVISED BY DATE			APPROVED BY DATE	
	SCALE NOT TO SCALE			DRAWING NO. FIGURE 4–3	REV. 0

REFERENCES

Department of the Army, U.S. Army Corps of Engineers (ACOE) 1999, Engineer Manual 1110-1-4010, Washington, DC, June

BBL 2000a. Baseline Sampling Report, Site C-2076, Trumbo Point BOQ, NAS Key West, Florida, July.

BBL 2001b. Tank Management Plan, NAS Key West, Florida, February.

BBL 2002. Remedial Action Plan, Site C-2076, Trumbo Point BOQ, NAS Key West, Florida, January.

EPA (United States Environmental Protection Agency) 1991. Management of Investigation – Derived Waste During Site Inspections. DER Directive 9345.3.02.FDEP (Florida Department of Environmental Protection), 2002. Groundwater Sampling SOPs, DEPSOP-001/01, FS 2200 Groundwater Sampling, Revised January 1, 2002.

PWC (Public Works Center) 1999. NAS Environmental Department, Pensacola, Florida, Site Assessment Report, Site C-2076, Trumbo Point BOQ, NAS Key West, Florida, June.

TtNUS (Tetra Tech NUS, Inc.) 1999. "Site Assessment Report for Building A902, Truck Fill Stand at Naval Air Station Key West, Florida", prepared for Southern Division Naval Facilities Engineering Command, North Charleston, South Carolina, April.

TtNUS 2002. Florida Regional Quality Assurance Program Manual, October.