

N00213.AR.000489  
NAS KEY WEST  
5090.3a

AIR SPARGING/SOIL VAPOR EXTRACTION TREATABILITY STUDY REPORT FOR  
BUILDING 189 FIRST QUARTER WITH TRANSMITTAL LETTER NAS KEY WEST FL  
11/1/2000  
TETRA TECH NUS



TETRA TECH NUS, INC.

AIK-00-0350

November 2, 2000

Project Number HK 7846

*via Electronic Mail*

Byas Glover (Code 18410)  
Department of the Navy  
SOUTHDIV NAVFACENGCOM  
P.O. Box 190010  
North Charleston, South Carolina 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888  
Contract Task Order No. 059

Subject: Air Sparging/Soil Vapor Extraction Treatability Study Report Plan, Rev. 1,  
Naval Air Station Key West, Florida

Dear Mr. Glover:

TtNUS is pleased to submit the enclosed PDF file for the final version of the Air Sparging/Soil Vapor Extraction Treatability Study Report Plan, Rev. 1, Naval Air Station Key West, Florida. At your request, a copy of this final report is being distributed to the Florida Department of Environmental Protection FDEP for their review and comment or concurrence. I am planning on receiving comments or concurrence on this document from FDEP within the next 30 days.

The air sparging and vapor extraction (AS/VE) treatability study system appears to be highly successful at removing the persistent globules of contamination that were previously observed at this site. The enclosed report recommends the consideration of terminating the treatability study after 6 months of operation, which will occur in early December 2000. I suggest that we discuss the possibility of terminating the study with FDEP on or before our Partnering Team meeting scheduled for the end of this month.

Please call me at (803) 649-7963, extension 345, if you have any questions regarding the enclosed report.

Sincerely,

C. M. Bryan  
Project Manager

CMB:spc

Enclosure

c: Ms. Debbie Wroblewski (Cover Letter Only)  
Mr. Jorge Caspary, FDEP  
File: 7846-7.3.2

Mr. R. Courtright, NAS Key West  
Mr. M. Perry/File

# **AIR SPARGING/SOIL VAPOR EXTRACTION TREATABILITY STUDY REPORT**

**for  
BUILDING 189**

**(1ST QUARTER)**

**Naval Air Station  
Key West, Florida**



**Southern Division  
Naval Facilities Engineering Command**

**Contract Number N62467-94-D-0888**

**Contract Task Order 059**

**November 2000**

*Revision 1*

**AIR SPARGING/SOIL VAPOR EXTRACTION  
TREATABILITY STUDY REPORT  
FOR  
BUILDING 189**

**(1<sup>ST</sup> QUARTER)**

**NAVAL AIR STATION  
KEY WEST, FLORIDA**

**COMPREHENSIVE LONG-TERM  
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT**

**Submitted to:  
Southern Division  
Naval Facilities Engineering Command  
2155 Eagle Drive  
North Charleston, South Carolina 29406**

**Submitted by:  
Tetra Tech NUS, Inc.  
661 Anderson Drive  
Foster Plaza 7  
Pittsburgh, Pennsylvania 15220**

**CONTRACT NUMBER N62467-94-D-0888  
CONTRACT TASK ORDER 0059**

**NOVEMBER 2000**

**PREPARED UNDER THE SUPERVISION OF:**

**APPROVED FOR SUBMITTAL BY:**

 *Mark T. Perry* for

---

**CHUCK BRYAN  
TASK ORDER MANAGER  
TETRA TECH NUS, INC.  
AIKEN, SOUTH CAROLINA**

---

**DEBBIE WROBLEWSKI  
PROGRAM MANAGER  
TETRA TECH NUS, INC.  
PITTSBURGH, PENNSYLVANIA**

## TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
<b>1.0 TREATABILITY STUDY REPORT .....</b>	<b>1-1</b>
1.1 SITE HISTORY OVERVIEW.....	1-1
1.2 MONITORING OBJECTIVES .....	1-1
1.3 SYSTEM DESCRIPTION.....	1-2
1.4 MONTHLY MONITORING .....	1-3
1.4.1 Free Product Monitoring.....	1-3
1.5 AS/SVE SYSTEM OPERATIONS.....	1-3
1.6 CONCLUSIONS AND RECOMMENDATIONS.....	1-4
<b>REFERENCES.....</b>	<b>R-1</b>

### APPENDIX A      LABORATORY REPORT

#### TABLES

<u>TABLE</u>	<u>PAGE</u>
1-1 VES Analytical and Performance Summary.....	1-5
1-2 Mass Vapor Emissions Calculations .....	1-6

#### FIGURES

<u>FIGURE</u>	<u>PAGE</u>
1-1 Site Map of Areal Extent of Soil and Free Product Contamination .....	1-7
1-2 Site Map of System Layout .....	1-8

## ACRONYMS

AS	air sparging
AS/SVE	Air Sparging/Soil Vapor Extraction
BTEX	benzene, toluene, ethylbenzene, and total xylenes
cfm	cubic feet per minute
CLEAN	Comprehensive Long-Term Environmental Action, Navy
CTO	Contract Task Order
EPA	U.S. Environmental Protection Agency
FDEP	Florida Department of Environmental Protection
GCTL	Groundwater Contaminant Target Levels
KAG	Kerosene Analytical Group
µg/kg	microgram per kilogram
mg/m <sup>3</sup>	milligram per cubic meter
MW	monitoring well
MOP	monitoring only plan
O&M	Operation and Maintenance
ppmv	part per million volume
psi	per square inch
PVC	polyvinyl chloride
TRPH	total recoverable petroleum hydrocarbons
TtNUS	Tetra Tech NUS, Inc.
VES	Vapor Extraction System
VEW	vapor extraction well
VOC	Volatile Organic Compounds

## **1.0 TREATABILITY STUDY REPORT**

Tetra Tech NUS, Inc. (TtNUS) is pleased to submit the Air Sparging/Soil Vapor Extraction (AS/SVE) Treatability Study Report for the referenced Contract Task Order (CTO). This report has been prepared for the U.S. Navy Southern Division Naval Facilities Engineering Command under CTO-059, for the Comprehensive Long-Term Environmental Action, Navy (CLEAN) Contract Number N62467-94-D-0888.

### **1.1 SITE HISTORY OVERVIEW**

Building 189 is located adjacent to the eastern seawall of the turning basin, which was formerly used to dock naval vessels. During reconstruction of the wharf in 1989, a north-to-south-oriented Bunker C fuel oil pipeline was discovered approximately 25 feet west of Building 189. The fuel line was broken prior to or during wharf reconstruction activities.

A contamination assessment was conducted in February 1992 and a report (ABB-ES, 1992) submitted to the Florida Department of Environmental Protection (FDEP). The report recommended a monitoring only plan (MOP) for the site. However, since free product was present in the wells at the site, FDEP required that the product be removed manually. Supplemental field investigations were conducted at the site to identify petroleum contaminants and their likely sources. A total of 17 soil borings, 12 shallow monitoring wells (MWs), and 1 deep MW were advanced at the site. In addition, one sediment sample was collected. Free product was observed in two MWs. The free product was a viscous, tarry substance that resembled Bunker C fuel. Total recoverable petroleum hydrocarbons (TRPH) and pyrene were the only contaminants detected in the groundwater samples collected (ABB-ES, 1993).

In 1998, TtNUS implemented a MOP at the site. Six wells were sampled for parameters of the Kerosene Analytical Group (KAG). By the end of the sixth quarter of sampling, petroleum hydrocarbon levels in the wells sampled were below Groundwater Contaminant Target Levels (GCTLs) for the site; however, free product was still present in MW-2. The product, Bunker C fuel oil, could not be recovered any further because its viscous nature prevented it from entering the bailer.

### **1.2 MONITORING OBJECTIVES**

In May 2000, an AS/SVE Treatability Study was initiated at the site to remediate residual hydrocarbon contaminants in the soil and groundwater (TtNUS, 2000). The study was conducted in two phases:

- Phase I involved a short-term test to evaluate the effectiveness of the system, over-drilling, and removal of MW-2, including soils in the immediate vicinity of the well.
- Phase II is a long-term evaluation of the Treatability Study and involves monitoring of the system's effectiveness for a period of one year.

The objective of Phase II is to remediate free product in the groundwater in the vicinity of former MW-2 to undetectable levels and to remediate any residual hydrocarbons in the soil to a level below the State of Florida's Leaching Potential of 30 µg/kg. A site map showing the approximate areal extent of soil and free product contamination is presented in Figure 1-1.

### **1.3 SYSTEM DESCRIPTION**

The remediation system design incorporates soil vapor extraction with air sparging to remove hydrocarbon contaminants from the soil and groundwater. Air sparging (AS) is achieved by a Roots-Dresser 5-horsepower injection blower that is capable of providing 56 cubic feet per minute (cfm) at 12 pounds per square inch (psi). Two 2-inch-diameter AS wells (AS-1 and AS-2), installed to the north and south of former MW-2, are used as injection points. The wells were constructed of 2-inch-diameter schedule 40 polyvinyl chloride (PVC) pipe with 18 feet of riser pipe and 2 feet of screen. The screen was placed at an interval of 18 to 20 feet, to ensure a depth of approximately 12 feet below the top of water table. Air is transferred between the blower and injection wells by 2-inch-diameter above-ground schedule 40 PVC pipes. These pipes are connected to the blowers with 2-inch hoses equipped with quick-disconnect camlocks.

Vapor extraction for the soil remediation portion of the system is provided by a Rotron 5-horsepower blower capable of 14 inches of mercury at 52 cfm. The vapor extraction well (VEW) VEW-1 was placed in the former location of MW-2 and between the two AS wells. It is constructed of 5-inch-diameter schedule 40 PVC pipe with 1 foot of riser and approximately 12 feet of screen. The screened interval was placed above and below the water table, which occurs between 5 and 6 feet. This allows for extracting vapors from the soil in the vadose zone and as a collection point for the recovery of free product at and below the water table. The VEW is also attached to the blower via a 2-inch PVC pipe. Prior to entering the blower, the moisture in the vapor stream is treated by a Rotron moisture separator. The condensate is automatically transferred to a knock-out tank with a Myers 0.5-horsepower motor. The vapors then pass through a series of carbon treatment drums before being discharged into the atmosphere. A permit for the AS/SVE system was not required because gas emissions were evaluated during Phase I of the study and levels of Volatile Organic Compounds (VOCs) did not exceed the 13.7 lbs/day limit of the U.S.

Environmental Protection Agency (EPA) Office of Solid Waste and Emergency Response Directive 9355.0-28. A site map showing the system layout is presented in Figure 1-2.

#### **1.4 MONTHLY MONITORING**

To monitor the effectiveness of the system, air/vapor samples were collected from the Vapor Extraction System (VES). TtNUS personnel visited the site on June 7, July 11, and August 17, 2000, to collect air samples. Samples were collected from the sampling ports located before (influent) and after (effluent) the carbon canisters, to evaluate the effectiveness of the carbon treatment. All sampling activities were conducted in accordance with the FDEP-approved TtNUS Comp QAP #980038.

Following collection, the air samples were shipped via overnight transport to Envirodyne Laboratories in Boca Raton, Florida. They were analyzed for benzene, toluene, ethylbenzene and total xylenes (BTEX) and TRPH by EPA Method TO-14. The analytical results of the first quarterly air sampling event are summarized in Table 1-1. A copy of the laboratory report is provided in Appendix A.

Analytical results indicate that petroleum hydrocarbons were detected in air samples collected during each sampling event from both the influent and effluent samples. Total BTEX concentrations were not detected during the June sampling event. Total BTEX concentrations were 0.26 milligrams per cubic meter ( $\text{mg}/\text{m}^3$ ) and  $0.82 \text{ mg}/\text{m}^3$  for the effluent samples collected in July and August, respectively. Total BTEX concentrations for influent samples in July and August were  $0.10 \text{ mg}/\text{m}^3$  and  $0.17 \text{ mg}/\text{m}^3$ , respectively. TRPH was detected during each sampling event of the quarter and ranged in concentration from 1.3 part per million volume (ppmv) to 3.0 ppmv in the effluent sample and 2.5 to 3.5 ppmv in the influent sample. Based on the detected hydrocarbon concentrations, the total emissions did not exceed the 13.7 pounds-per-day FDEP limit during the quarter. Mass vapor emissions calculations for the highest effluent concentrations detected during the quarter are presented in Table 1-2.

##### **1.4.1 Free Product Monitoring**

During the monthly visits, wells VEW-1, AS-1, AS-2, and the observation well (OW-1) were gauged for the presence of free product. No free product was detected during the quarter.

#### **1.5 AS/SVE SYSTEM OPERATIONS**

The remedial system has operated effectively since startup at the beginning of June 2000. TtNUS performed routine Operation and Maintenance (O&M) during the monthly site visits. The system operated continuously during the three-month period with no down time.

## 1.6 CONCLUSIONS AND RECOMMENDATIONS

Total BTEX and TRPH concentrations were detected in the air samples during the monthly sampling event of the quarter. However, total emissions did not exceed the 13.7 pounds-per-day limit allowed by the FDEP. The August 17, 2000, sampling results appear to be anomalous. The effluent sample results are greater than those for the influent samples. The cause of the discrepancy has not been determined. Overall, the system appears to be running efficiently and no down time was experienced.

Based on results of the first quarterly sampling event, TtNUS recommends continuation of the AS/SVE long-term study for at least an additional three months, for a total operation time of at least six months. The Navy and FDEP should consider terminating the treatability study after of six months of operation if emissions remain low and no free product is observed in the well.



**TABLE 1-2**  
**MASS VAPOR EMISSIONS CALCULATIONS**  
**NAVAL AIR STATION**  
**KEY WEST, FLORIDA**

<b>PARAMETER</b>	<b>EFFLUENT RESULT (<math>\mu\text{g}/\text{m}^3</math>)<sup>*</sup></b>
Benzene	0
Toluene	40
Ethylbenzene	60
Total Xylenes	180
Methyl-tert-butyl-ether	0
TRPH	2800
<b><math>\mu\text{g}/\text{m}^3</math> of total (detectable) VOCs&gt;&gt;&gt;</b>	<b>3080.0</b>
<b><math>\mu\text{g}/\text{ft}^3</math> of total (detectable) VOCs&gt;&gt;&gt;</b>	<b>87.22</b>
<b><math>\text{ft}^3/\text{min. (cfm)}</math> out of the carbon &gt;&gt;&gt;</b>	<b>52</b>
<b><math>\mu\text{g}/\text{min}</math> out of the carbon &gt;&gt;&gt;</b>	<b>4535</b>
<b>minutes per day (24 hrs.)</b>	<b>1440</b>
<b><math>\mu\text{g}/\text{day}</math> &gt;&gt;&gt;</b>	<b>6.53E+06</b>
<b>pounds/day</b>	<b>0.01</b>
<b>pounds/month based on 30 days&gt;&gt;</b>	<b>0.43</b>

\* Only detectable results are used in calculations





## REFERENCES

ABB-ES (Environmental Services, Inc.), 1992. Contamination Assessment Report, Truman Annex Berthing Wharf Building 189, Naval Air Station Key West, Florida, prepared for Southern Division Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), Charleston, South Carolina, February.

ABB-ES (Environmental Services, Inc.), 1993. Contamination Assessment Report Addendum, Electric Power Plant, Building 103, Truman Annex, Naval Air Station Key West, Florida, prepared for Southern Division Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), Charleston, South Carolina.

TtNUS, (Tetra Tech NUS, Inc.), 2000. Air Sparging/Vapor Extraction Treatability Study Work Plan for Building 189, Truman Annex, Naval Air Station Key West, Key West, Florida, prepared for Southern Division Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), Charleston, South Carolina, May.

**APPENDIX A**  
**LABORATORY REPORT**

# Envirodyne Inc.

4805 N.W. 2nd Avenue  
Boca Raton, FL 3343  
561-989-522

Tetra-Tech NUS, Inc.  
794 South Military Trail  
Deerfield Beach, FL 33442

June 14, 2000  
Report: 2000\0610  
Sample No: 2000\06107-

Attention: Richard Ofsanko

Project: N7846 NAS Truman Annex #189  
Key West, FL

SAMPLE ID: B189-060700-VINF-01

Collected by: Your Representative

Collected on: 06/07/00

Received on: 06/08/00

Date of Analysis: 06/08/00

## TO-14 BTEX/TRPH

PARAMETER	RESULT	DL UNITS	ANALYST
Benzene	BDL	0.01 ppmv	SPH
Ethylbenzene	BDL	0.01 ppmv	SPH
Methyl-tert-butyl-ether	BDL	0.01 ppmv	SPH
Toluene	BDL	0.01 ppmv	SPH
Xylenes, Total	BDL	0.01 ppmv	SPH
Total BTEX	BDL	ppmv	SPH
Total Petroleum Hydrocarbons	2.5	0.1 ppmv	SPH
Benzene	BDL	0.03 mg/m3	SPH
Ethylbenzene	BDL	0.05 mg/m3	SPH
Methyl-tert-butyl-ether	BDL	0.04 mg/m3	SPH
Toluene	BDL	0.04 mg/m3	SPH
Xylenes, Total	BDL	0.05 mg/m3	SPH
Total BTEX	BDL	mg/m3	SPH

# Envirodyne Inc.

4805 N.W. 2nd Avenue  
Boca Raton, FL 3343  
561-989-522

Tetra-Tech NUS, Inc.  
794 South Military Trail  
Deerfield Beach, FL 33442

June 14, 200  
Report: 2000\0610  
Sample No: 2000\06107-

Attention: Richard Ofsanko

Project: N7846 NAS Truman Annex #189  
Key West, FL

SAMPLE ID: B189-060700-VINF-DUP

Collected by: Your Representative

Collected on: 06/07/00

Received on: 06/08/00

Date of Analysis: 06/08/00

## TO-14 BTEX/TRPH

PARAMETER	RESULT	DL UNITS	ANALYST
Benzene	BDL	0.01 ppmv	SPH
Ethylbenzene	BDL	0.01 ppmv	SPH
Methyl-tert-butyl-ether	BDL	0.01 ppmv	SPH
Toluene	BDL	0.01 ppmv	SPH
Xylenes, Total	BDL	0.01 ppmv	SPH
Total BTEX	BDL	ppmv	SPH
Total Petroleum Hydrocarbons	2.5	0.1 ppmv	SPH
Benzene	BDL	0.03 mg/m3	SPH
Ethylbenzene	BDL	0.05 mg/m3	SPH
Methyl-tert-butyl-ether	BDL	0.04 mg/m3	SPH
Toluene	BDL	0.04 mg/m3	SPH
Xylenes, Total	BDL	0.05 mg/m3	SPH
Total BTEX	BDL	mg/m3	SPH

# Envirodyne Inc.

4805 N.W. 2nd Avenue  
Boca Raton, FL 3343  
561-989-522

Tetra-Tech NUS, Inc.  
794 South Military Trail  
Deerfield Beach, FL 33442

June 14, 2000  
Report: 2000\0610  
Sample No: 2000\06107-

Attention: Richard Ofsanko

Project: N7846 NAS Truman Annex #189  
Key West, FL

SAMPLE ID: B189-060700-VEFF-01

Collected by: Your Representative

Collected on: 06/07/00

Received on: 06/08/00

Date of Analysis: 06/08/00

## TO-14 BTEX/TRPH

PARAMETER	RESULT	DL UNITS	ANALYST
Benzene	BDL	0.01 ppmv	SPH
Ethylbenzene	BDL	0.01 ppmv	SPH
Methyl-tert-butyl-ether	BDL	0.01 ppmv	SPH
Toluene	BDL	0.01 ppmv	SPH
Xylenes, Total	BDL	0.01 ppmv	SPH
Total BTEX	BDL	ppmv	SPH
Total Petroleum Hydrocarbons	1.3	0.1 ppmv	SPH
Benzene	BDL	0.03 mg/m3	SPH
Ethylbenzene	BDL	0.05 mg/m3	SPH
Methyl-tert-butyl-ether	BDL	0.04 mg/m3	SPH
Toluene	BDL	0.04 mg/m3	SPH
Xylenes, Total	BDL	0.05 mg/m3	SPH
Total BTEX	BDL	mg/m3	SPH

# Envirodyne Inc.

4805 N.W. 2nd Avenue  
Boca Raton, FL 33433  
561-989-5222

Tetra-Tech NUS, Inc.  
794 South Military Trail  
Deerfield Beach, FL 33442

June 14, 2000  
Report: 2000\06107-  
Sample No: 2000\06107-

Attention: Richard Ofsanko

Project: N7846 NAS Truman Annex #189  
Key West, FL

SAMPLE ID: B189-060700-VEFF-02

Collected by: Your Representative

Collected on: 06/07/00  
Received on: 06/08/00

Date of Analysis: 06/08/00

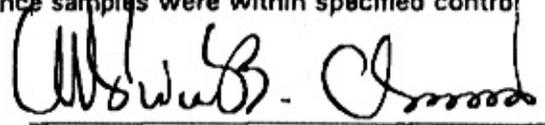
## TO-14 BTEX/TRPH

PARAMETER	RESULT	DL UNITS	ANALYST
Benzene	BDL	0.01 ppmv	SPH
Ethylbenzene	BDL	0.01 ppmv	SPH
Methyl-tert-butyl-ether	BDL	0.01 ppmv	SPH
Toluene	BDL	0.01 ppmv	SPH
Xylenes, Total	BDL	0.01 ppmv	SPH
Total BTEX	BDL	ppmv	SPH
Total Petroleum Hydrocarbons	1.1	0.1 ppmv	SPH
Benzene	BDL	0.03 mg/m3	SPH
Ethylbenzene	BDL	0.05 mg/m3	SPH
Methyl-tert-butyl-ether	BDL	0.04 mg/m3	SPH
Toluene	BDL	0.04 mg/m3	SPH
Xylenes, Total	BDL	0.05 mg/m3	SPH
Total BTEX	BDL	mg/m3	SPH

Analysis contained herein conform to EPA and DEP approved methods per Envirodyne Comprehensive Quality Assurance Plan No. 890041. Additional Laboratory Certification numbers: E86006, 84269, E83079, E86240, South Carolina 96022. All relevant quality assurance samples were within specified control limits unless otherwise stated.



Project Manager



Quality Assurance Director

## CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

 4805 NW 2nd Avenue • Boca Raton, FL 33431  
 (561) 989-5225 • Fax (561) 989-5204

PROJECT NUMBER <b>17846</b>	PROJECT NAME <b>NAS Trumet Bay #189</b>	P.O. NUMBER <b>17846</b>	SAMPLE TYPE <b>NA</b>	PRESERVATIVE					
PROJECT LOCATION <b>KEY WEST FL</b>		CLIENT NAME <b>FETA FAC</b>		CLIENT ADDRESS <b>774 S. Military Trail</b>		ANALYSES REQUESTED		NO. OF CONTAINERS	RUSH TAT (SURCHARGE) <input type="checkbox"/>
CLIENT ADDRESS						PHONE <b>959 570 5885</b> FAX <b>561 313 1511</b>			

SAMPLE INFORMATION				SOLID	LIQUID	AIR	NON-AQUEOUS LIQUID	ANALYSES REQUESTED				NO. OF CONTAINERS	REMARKS
NUMBER	DATE	TIME	IDENTIFICATION										
1	<del>060700</del> 060700	1000	060700 B189-060700-VEPF-01				✓					1	
2	<del>060700</del> 060700	1000	060700 B189-060700-VEPF-DUP				✓					1	
3	<del>060700</del> 060700	1015	060700 B-189-060700-VEPF-01				✓					1	
4	<del>060700</del> 060700	1500	060700 B189-060700-VEPF-02				✓					1	
5													
6													
7													
8													
9													
10													

SAMPLE COLLECTED BY	TOTAL OF ALL CONTAINERS	<b>4</b>
---------------------	-------------------------	----------

SEND REPORT TO (PERSON)	REQUISITIONED BY	DATE	TIME	RECEIVED BY	DATE	TIME
<b>Richard Ofonko</b>		05/30/00			5/31/00	
SAMPLES CONDITION <b>Intact</b>		5/7/00	1200		05/07/00	17:00
LOG NUMBER <b>1006107</b>	<b>Fedor</b>					

09-21-2000 03:35PM FROM-ENVIRODYNE 561-989-5204 T-533 P 002/006 F-078

# Envirodyne Inc.

4805 N.W. 2nd Avenue  
Boca Raton, FL 33431  
561-989-5225

Tetra-Tech NUS, Inc.  
794 South Military Trail  
Deerfield Beach, FL 33442

July 14, 2000  
Report: 2000\07125  
Sample No: 2000\07125- 1

Attention: Richard Ofsanko

Project: N7846 NAS Key West  
Key West, FL

SAMPLE ID: B189-071100-VEFF-02

Collected by: Your Representative

Collected on: 07/11/00  
Received on: 07/12/00

Date of Analysis: 07/13/00

## TO-14 BTEX/TRPH

PARAMETER	RESULT	DL UNITS	ANALYST
Benzene	BDL	0.01 ppmv	SPH
Ethylbenzene	0.01	0.01 ppmv	SPH
Methyl-tert-butyl-ether	BDL	0.01 ppmv	SPH
Toluene	BDL	0.01 ppmv	SPH
Xylenes, Total	0.05	0.01 ppmv	SPH
Total BTEX	0.06	ppmv	SPH
Total Petroleum Hydrocarbons	1.4	0.1 ppmv	SPH
Benzene	BDL	0.03 mg/m3	SPH
Ethylbenzene	0.05	0.05 mg/m3	SPH
Methyl-tert-butyl-ether	BDL	0.04 mg/m3	SPH
Toluene	BDL	0.04 mg/m3	SPH
Xylenes, Total	0.21	0.05 mg/m3	SPH
Total BTEX	0.26	mg/m3	SPH

# Envirodyne Inc.

4805 N.W. 2nd Avenue  
Boca Raton, FL 33431  
561-989-5225

Tetra-Tech NUS, Inc.  
794 South Military Trail  
Deerfield Beach, FL 33442

July 14, 2000  
Report: 2000\07125  
Sample No: 2000\07125- 2

Attention: Richard Ofsanko

Project: N7846 NAS Key West  
Key West, FL

SAMPLE ID: B189-071100-VINF-02

Collected by: Your Representative

Collected on: 07/11/00

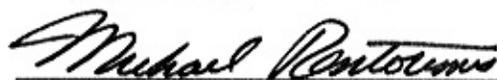
Received on: 07/12/00

Date of Analysis: 07/13/00

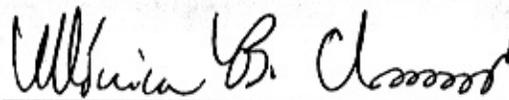
## TO-14 BTEX/TRPH

PARAMETER	RESULT	DL UNITS	ANALYST
Benzene	BDL	0.01 ppmv	SPH
Ethylbenzene	BDL	0.01 ppmv	SPH
Methyl-tert-butyl-ether	BDL	0.01 ppmv	SPH
Toluene	BDL	0.01 ppmv	SPH
Xylenes, Total	0.02	0.01 ppmv	SPH
Total BTEX	0.02	ppmv	SPH
Total Petroleum Hydrocarbons	3.5	0.1 ppmv	SPH
Benzene	BDL	0.03 mg/m3	SPH
Ethylbenzene	BDL	0.05 mg/m3	SPH
Methyl-tert-butyl-ether	BDL	0.04 mg/m3	SPH
Toluene	BDL	0.04 mg/m3	SPH
Xylenes, Total	0.10	0.05 mg/m3	SPH
Total BTEX	0.10	mg/m3	SPH

Analysis contained herein conform to EPA and DEP approved methods per Envirodyne Comprehensive Quality Assurance Plan No. 890041. Additional Laboratory Certification numbers: E86006, 84269, E83079, E86240, South Carolina 96022. All relevant quality assurance samples were within specified control limits unless otherwise stated.



Project Manager



Quality Assurance Director



Tetra-Tech NUS, Inc.  
794 South Military Trail  
Deerfield Beach, FL 33442

August 28, 2000  
Report: 2000\08260  
Sample No: 2000\08260- 1

Attention: Steve Jackson

Project: N7846 NAS Key West  
Key West, FL

SAMPLE ID: B189-081700-VEFF-03

Collected by: Skip Vaillancourt

Collected on: 08/17/00

Received on: 08/18/00

Date of Analysis: 08/19/00

## TO-14 BTEX/TRPH

PARAMETER	RESULT	DL UNITS	ANALYST
Benzene	BDL	0.01 ppmv	SPH
Ethylbenzene	0.01	0.01 ppmv	SPH
Methyl-tert-butyl-ether	BDL	0.01 ppmv	SPH
Toluene	0.01	0.01 ppmv	SPH
Xylenes, Total	0.04	0.01 ppmv	SPH
Total BTEX	0.06	ppmv	SPH
Total Petroleum Hydrocarbons	3.0	0.1 ppmv	SPH
Benzene	BDL	0.03 mg/m3	SPH
Ethylbenzene	0.06	0.05 mg/m3	SPH
Methyl-tert-butyl-ether	BDL	0.04 mg/m3	SPH
Toluene	0.04	0.04 mg/m3	SPH
Xylenes, Total	0.18	0.05 mg/m3	SPH
Total BTEX	0.82	mg/m3	SPH

# Envirodyne Inc.

4805 N.W. 2nd Avenue  
Boca Raton, FL 33431  
561-989-5225

Tetra-Tech NUS, Inc.  
794 South Military Trail  
Deerfield Beach, FL 33442

August 28, 2000  
Report: 2000\08260  
Sample No: 2000\08260- 2

Attention: Steve Jackson

Project: N7846 NAS Key West  
Key West, FL

SAMPLE ID: B189-081700-VINF-03

Collected by: Skip Vaillancourt

Collected on: 08/17/00

Received on: 08/18/00

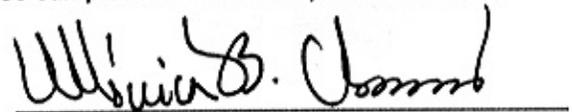
Date of Analysis: 08/19/00

## TO-14 BTEX/TRPH

PARAMETER	RESULT	DL UNITS	ANALYST
Benzene	BDL	0.01 ppmv	SPH
Ethylbenzene	0.01	0.01 ppmv	SPH
Methyl-tert-butyl-ether	BDL	0.01 ppmv	SPH
Toluene	BDL	0.01 ppmv	SPH
Xylenes, Total	0.03	0.01 ppmv	SPH
Total BTEX	0.04	ppmv	SPH
Total Petroleum Hydrocarbons	2.8	0.1 ppmv	SPH
Benzene	BDL	0.03 mg/m3	SPH
Ethylbenzene	0.05	0.05 mg/m3	SPH
Methyl-tert-butyl-ether	BDL	0.04 mg/m3	SPH
Toluene	BDL	0.04 mg/m3	SPH
Xylenes, Total	0.12	0.05 mg/m3	SPH
Total BTEX	0.17	mg/m3	SPH

Analysis contained herein conform to EPA and DEP approved methods per Envirodyne Comprehensive Quality Assurance Plan No. 890041. Additional Laboratory Certification numbers: E86006, 84269, E83079, E86240, South Carolina 96022. All relevant quality assurance samples were within specified control limits unless otherwise stated.

  
Project Manager

  
Quality Assurance Director

Analysis Performed in Accordance with E.P.A. Methods  
Laboratory Certification No. E86188  
Laboratory Certification No. 86405

QA/QC Review   
BDL = Below Detection Limit  
DL = Detection Limit

PROJECT NUMBER <b>177846</b>	PROJECT NAME <b>NAS Key West</b>	P.O. NUMBER <b>177846 P341 (SS)</b>	SAMPLE TYPE <b>10-14</b>	PRESERVATIVE
PROJECT LOCATION <b>Key West FL</b>	ANALYSES REQUESTED			NO. OF CONTAINERS <b>2</b>
CLIENT NAME <b>FETIA TRC</b>	CLIENT ADDRESS <b>794.5 military trail Deerfield Bch FL 33442</b>	PHONE <b>9545709885</b>	FAX	
DUE DATE: _____				

### SAMPLE INFORMATION

NUMBER	DATE	TIME	IDENTIFICATION	SOLID	LIQUID	AIR	NON-AQUEOUS LIQUID	ANALYSES REQUESTED	NO. OF CONTAINERS	REMARKS
1	8/17/00	1000	B189 - 081700 - VEFF - 03		X		X		2	B189 VEFF
2	8/17/00	1015	B189 - 081700 - VICH - 03		X		X		2	One of two bags was open on arrival
3										
4										
5										
6										
7										
8										
9										
10										

SAMPLE COLLECTED BY <b>Steve Vallarand</b>	TOTAL OF ALL CONTAINERS							
SEND REPORT TO (PERSON) <b>Steve Tacka</b>	RELINQUISHED BY <b>[Signature]</b>	DATE <b>8/17/00</b>	TIME <b>15:15</b>	RECEIVED BY <b>[Signature]</b>	DATE <b>8/18/00</b>	TIME <b>1515</b>		
SAMPLES CONDITION <b>Not Intact (See Remarks)</b>				<b>FEDEX</b>	<b>Bala Manoharan</b>	<b>8-18-2000</b>	<b>950</b>	
LOG NUMBER <b>0008260</b>								