**TETRA TECH NUS, INC.**
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C-51-10-8-79

October 30, 1998

Project Number

Mr. Lonnie Monaco
Naval facilities Engineering Command (NAVFACENGCOM)
Northern Division
Environmental Contracts Division
10 industrial Highway
Lester, Pennsylvania 19113

Reference: CLEAN contract No. N624272-D-1298
Contract Tack Order (CTO) No. 252

Subject: Verification Sample Analysis Results for Removal Activities Area A Site 3
Naval Air Warfare Center (NAWC) Warminster, Pennsylvania

Dear Mr. Monaco:

This letter summarizes the results of the Tetra Tech NUS (TtNUS) post-excavation sampling and analysis preformed at the subject site. Six samples were collected from excavation 3A on October 23,1998 after the completion of the excavation by the Navy RAC (Foster Wheeler). Samples were collected from the excavation side and endwalls on 15 foot centers. Sample locations and descriptions are presented in Attachment 1.

All samples were analyzed for Anthracene, Benzo (a) anthracene, Benzo (a) pyrene, and Fluoranthene. The data has not undergone full data validation review. The laboratory analytical results can be found in Attachment 2. The analytical results were compared to the Preliminary Remediation Goals (PRG) established for the site [Anthracene (540 ug/kg), Benzo (a) anthracene (2,300 ug/kg), Benzo (a) pyrene (2,500 ug/kg) and Fluoranthene (5,000 ug/kg)]. The results were also statistically evaluated to calculate the Upper 95% Confidence Level concentration (UCL) for each compound. The calculated UCLs were compared to compound specific PRGs as outlined in the Verification Sampling and Analysis Plan (VSAP). The results of the statistical evaluation are presented in Attachment 3.

A review of the data indicates:

- The PRGs for all four compounds were exceeded in two samples (VS-3A-04S and VS-3A-05S). These samples were collected along the northern endwall and northeastern sidewall of the excavation toward the Jacksonville Road side of the excavation. The samples were taken from one foot BGS. Sample VS-3A-04S consisted of a red-brown sandy silt with rock fragments and organic material. A large portion of the northern end wall contained asphalt chunks. Sample VS-3A-05S consisted of red-brown sandy silt with traces of clay. There were no traces of asphalt along the northeastern sidewall of the excavation.

- No PRGs were exceeded in the remaining four samples.

- The UCLs for Anthracene (573,000 ug/kg), Benzo (a) anthracene (138,000 ug/kg), Benzo (a) pyrene (64,200 ug/kg), and Fluoranthene (610,000 ug/kg) exceeded the PRGs.

Recommendations

The use of the UCL to determine attainment of clean-up goals may not be appropriate. The relatively low number of samples is not conducive to meaningful statistical evaluation. It is recommended that further evaluation be limited to the comparison of sample analytical results to the PRGs.

Based on the findings of the verification sampling and the above evaluation it is recommended that the Navy further excavate the northern end wall and northeastern corner of the excavation in the areas of sample numbers VS-3A-04S and VS-3A-05S. The excavation should be continued in a northerly direction until the asphalt material has been removed and clean soil is noted. The extent of the further excavation to the northeast should be based on a field decision considering the type and color of material encountered and considering the proximity of Jacksonville Road.

The Navy may want to consider partial back filling to protect the integrity of the exposed storm sewer pipeline and to allow better access for the RAC to the area needing excavation before further work is conducted.

Respectfully;

Garth Glenn
Project Manager

GG/ejc

c Tom Ames (NAVFACENGCOM)
Tim McAntee (NAVFACENGCOM)
Steve Lehman (NAVACENGCOM)
Darius Ostrauskas (EPA Region III)
April Flipse (PADEP)
Neil Teamerson (B&R Environmental)
Jeff Orient (B&R Environmental)

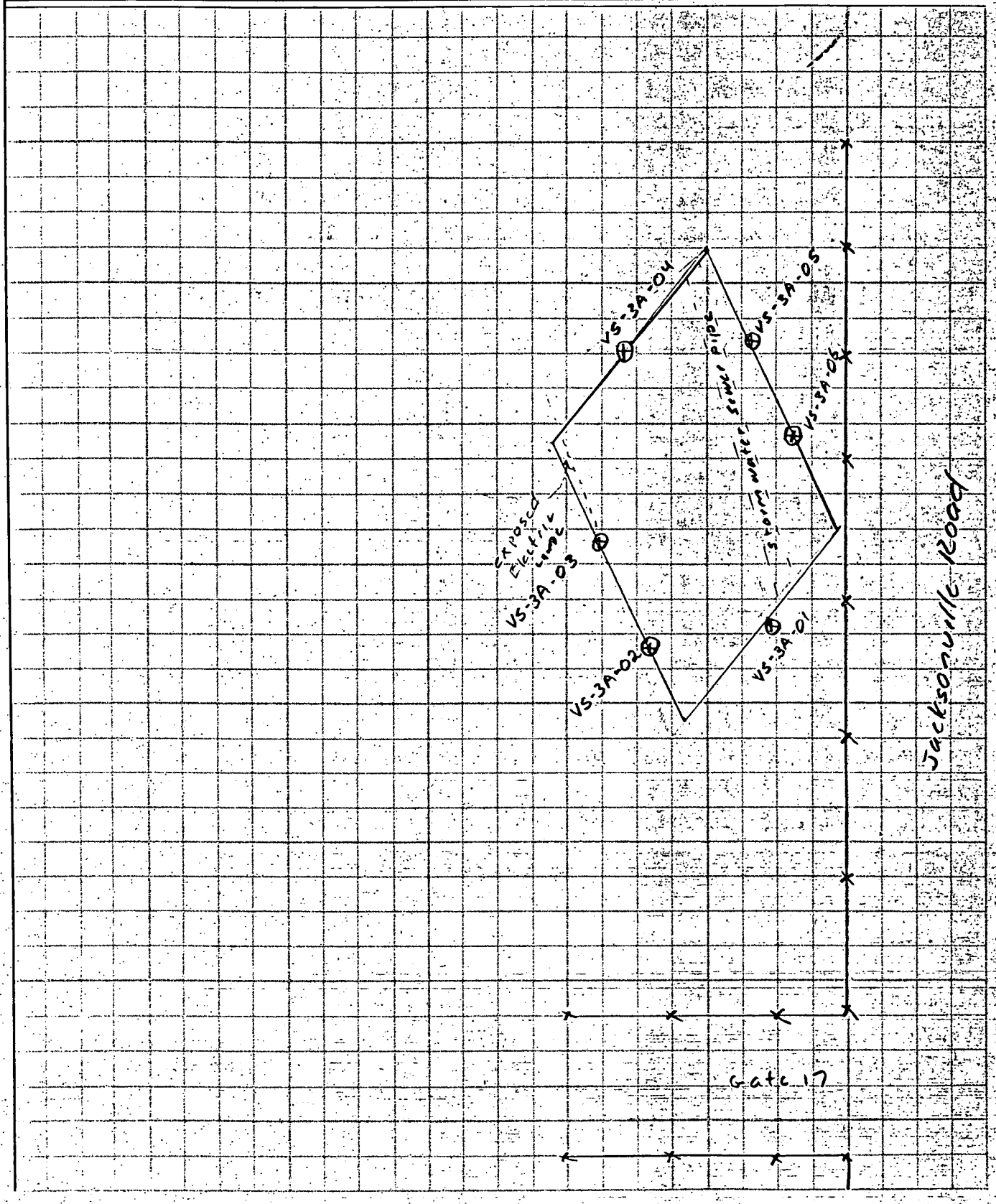
**ATTACHMENT 1**

# CALCULATION WORKSHEET

Order No. 19116 (01-91)

PAGE ____ OF ____

| CLIENT | | JOB NUMBER | |
|---|---|---|---|
| SUBJECT | | | |
| BASED ON | | DRAWING NUMBER | |
| BY | CHECKED BY | APPROVED BY | DATE |



# SOLID/SOIL/SEDIMENT SAMPLE LOG SHEET

TETRA TECH NUS, INC.

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Lagoon/Pond
- [ ] Other _____

Project Site Name: NAWC Warminster

Project Site Number: CTO 252

Source Number: VS-3A-01S

Source Location: Area A Site 3

**Sample Method:** Stainless Steel Trowel

**Depth Sampled:** 6" - 12"

**Sample Date & Time:** 10/23/98 0915

**Sampled by:** Matt Woolford

**Signature(s):**

**Sample Type**

- [x] Low Concentration
- [ ] High Concentration
- [x] Grab
- [ ] Composite
- [ ] Grab - Composite

| Analysis | Preservative: |
|---|---|
| [ ] TCL VOAs | dark, 4°C |
| [ ] TCL SVOAs | dark, 4°C |
| [ ] TCL Pest/PCBs | dark, 4°C |
| [ ] TAL Metals | 4°C |
| [ ] Cyanide | 4°C |
| [x] Benzo(a)anthracene anthracene Benzo(a)pyrene Fluoranthene | 4°C |
| | |
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| | |

**Observations and Notes**

- [ ] Duplicate sample taken

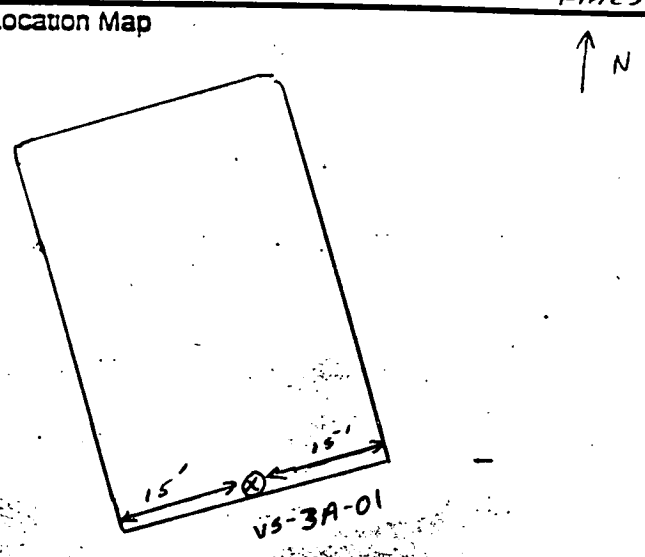
**Composite Sample Data**

| Sample | Time | Color and Description |
|---|---|---|
| | | |

**Sample Data**

| Color | Description: (Sand, Clay, Dry, Moist, Wet, etc.) |
|---|---|
| Brown | Silty clay with rock Fragments and Fines |

Sample Location Map




Revised 4/6/96

# SOLID/SOIL/SEDIMENT SAMPLE LOG SHEET

TETRA TECH NUS, INC.

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Lagoon/Pond
- [ ] Other _____

Project Site Name: NAWC Warminster

Project Site Number: CTO 252

Source Number: VS-3A-02 $

Source Location: Area A Site 3

**Sample Method:** Stainless Steel Trowel

**Depth Sampled:** 6-12"

**Sample Date & Time:** 10/23/98

**Sampled by:** Matt Woolford

**Signature(s):**

**Sample Type**

- [x] Low Concentration
- [ ] High Concentration
- [x] Grab
- [ ] Composite
- [ ] Grab - Composite

| Analysis | Preservative: |
|---|---|
| [ ] TCL VOAs | dark, 4°C |
| [ ] TCL SVOAs | dark, 4°C |
| [ ] TCL Pest/PCBs | dark, 4°C |
| [ ] TAL Metals | 4°C |
| [ ] Cyanide | 4°C |
| [x] Benzo(a) anthracene, anthracene Benzo(a) pyrene, Fluoranthene | 4°C |
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**Observations and Notes**

- [ ] Duplicate sample taken

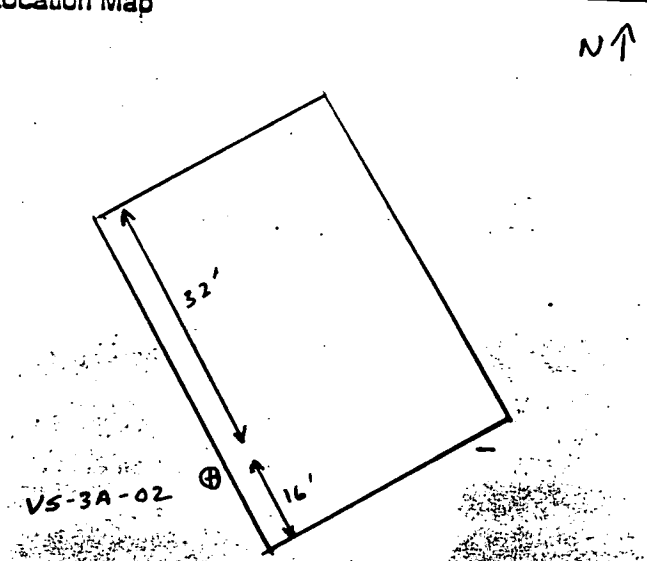
**Composite Sample Data**

| Sample | Time | Color and Description |
|---|---|---|
| | | |

**Sample Data**

| Color | Description: (Sand, Clay, Dry, Moist, Wet, etc.) |
|---|---|
| Brown | Silty Clay with Rock Frag fines and some organics |

**Sample Location Map**




Revised 4/8/96

# SOLID/SOIL/SEDIMENT SAMPLE LOG SHEET

TETRA TECH NUS, INC.

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Lagoon/Pond
- [ ] Other _____

Project Site Name: NAWC Warminster

Project Site Number: CTO 252

Source Number: VS-3A-03$

Source Location: Area A Site 3

Sample Method: Stainless Steel trowel

Depth Sampled: 6" - 12"

Sample Date & Time: 10/23/98

Sampled by: Matt Woolford

Signature(s):

**Composite Sample Data**

| Sample | Time | Color and Description |
|---|---|---|
| | | |

**Sample Type**

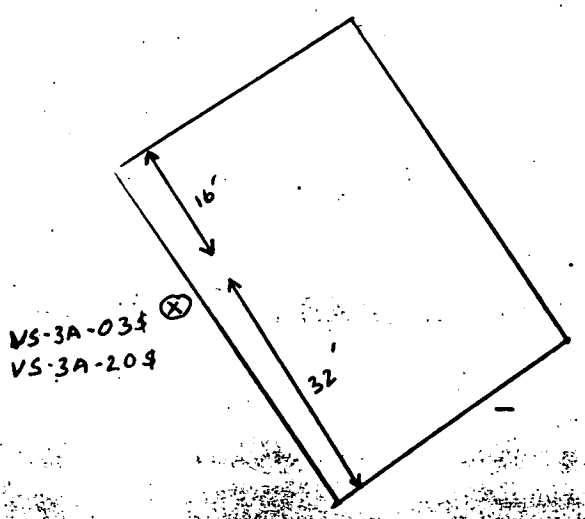
- [x] Low Concentration
- [ ] High Concentration
- [x] Grab
- [ ] Composite
- [ ] Grab - Composite

**Sample Data**

| Color | Description: (Sand, Clay, Dry, Moist, Wet, etc.) |
|---|---|
| Brown to Black | Sandy silt with rock frag fines pebbles and wood |

| Analysis | Preservative: |
|---|---|
| [ ] TCL VOAs | dark, 4°C |
| [ ] TCL SVOAs | dark, 4°C |
| [ ] TCL Pest/PCBs | dark, 4°C |
| [ ] TAL Metals | 4°C |
| [ ] Cyanide | 4°C |
| [x] Anthracene, Benzo(a) anthracene, Benzo (a) pyrene, Fluoranthene | 4°C |

**Sample Location Map**




**Observations and Notes**

- [x] Duplicate sample taken: VS-3A-20$ MS/MSD

# SOLID/SOIL/SEDIMENT SAMPLE LOG SHEET

TETRA TECH NUS, INC.

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Lagoon/Pond
- [ ] Other_____

Project Site Name: NAWC Warminster

Project Site Number: CTO 252

Source Number: VS-3A-04$

Source Location: Area A Site 3

Sample Method: Stainless Steel Trowel

Depth Sampled: 6"-12"

Sample Date & Time: 10/23/98

Sampled by: Matt Woolford

Signature(s):

**Sample Type**

- [x] Low Concentration
- [ ] High Concentration
- [x] Grab
- [ ] Composite
- [ ] Grab - Composite

| Analysis | Preservative: |
|---|---|
| [ ] TCL VOAs | dark. 4°C |
| [ ] TCL SVOAs | dark. 4°C |
| [ ] TCL Pest/PCBs | dark. 4°C |
| [ ] TAL Metals | 4°C |
| [ ] Cyanide | 4°C |
| [x] Anthracene, Benzo(k) anthracene, Benzo(a) pyrene, Fluoranthene | 4°C |
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**Composite Sample Data**

| Sample | Time | Color and Description |
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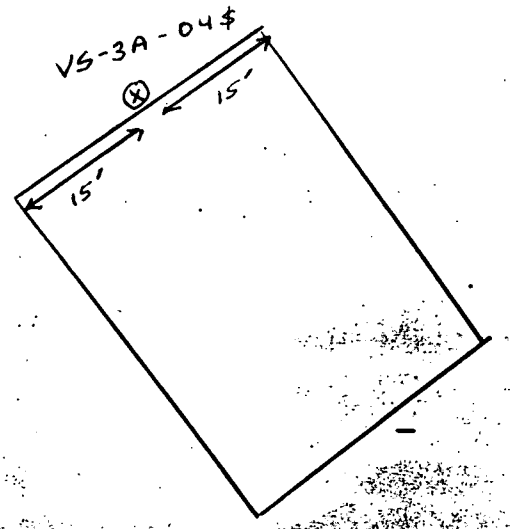
**Sample Data**

| Color | Description: (Sand, Clay, Dry, Moist, Wet, etc.) |
|---|---|
| Red Brown | Sandy silt with rock frag and organics |

Sample Location Map




Observations and Notes

- [ ] Duplicate sample taken

Revision 4/2/98

# SOLID/SOIL/SEDIMENT SAMPLE LOG SHEET

TETRA TECH NUS, INC.

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Lagoon/Pond
- [ ] Other _____

Project Site Name: NAWC Warminster

Project Site Number: CTO 252

Source Number: VS-3A-05$

Source Location: Area A Site 3

Sample Method:

Depth Sampled: 6" - 12"

Sample Date & Time: 10/23/98

Sampled by: Matt Woolford

Signature(s):

**Sample Type**

- [x] Low Concentration
- [ ] High Concentration
- [x] Grab
- [ ] Composite
- [ ] Grab - Composite

| Analysis | Preservative: |
|---|---|
| [ ] TCL VOAs | dark, 4°C |
| [ ] TCL SVOAs | dark, 4°C |
| [ ] TCL Pest/PCBs | dark, 4°C |
| [ ] TAL Metals | 4°C |
| [ ] Cyanide | 4°C |
| [x] Anthracene, Benzo(a) Anthracene, Benzo(a) pyrene, Fluoranthene | 4°C |
| | |
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**Composite Sample Data**

| Sample | Time | Color and Description |
|---|---|---|
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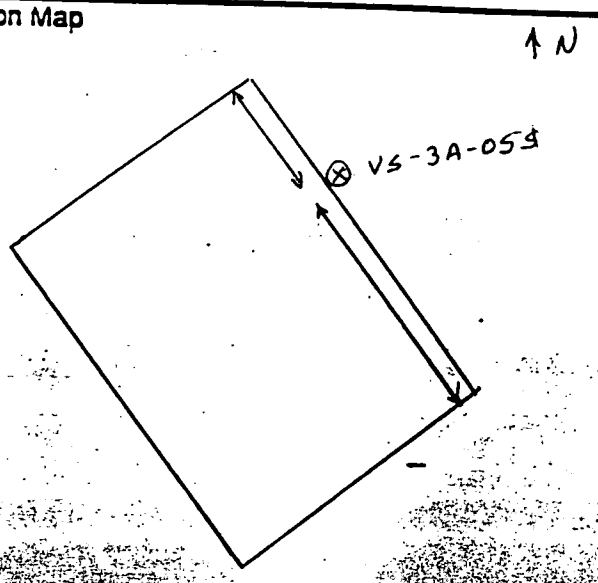
**Sample Data**

| Color | Description: (Sand, Clay, Dry, Moist, Wet, etc.) |
|---|---|
| Red Brown | sandy silt with trace clay |

Sample Location Map




**Observations and Notes**

- [ ] Duplicate sample taken

# SOLID/SOIL/SEDIMENT SAMPLE LOG SHEET

TETRA TECH NUS, INC.

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Lagoon/Pond
- [ ] Other _____

Project Site Name: NAWC Warminster

Project Site Number: CTO 252

Source Number: VS-3A-065

Source Location: Area A Site 3

**Sample Method:** Stainless Steel Trowel

**Depth Sampled:** 6" - 12"

**Sample Date & Time:** 10/23/98

**Sampled by:** Matt Woolford

**Signature(s):**

**Composite Sample Data**

| Sample | Time | Color and Description |
|---|---|---|
| | | |

**Sample Type**

- [x] Low Concentration
- [ ] High Concentration
- [x] Grab
- [ ] Composite
- [ ] Grab - Composite

**Sample Data**

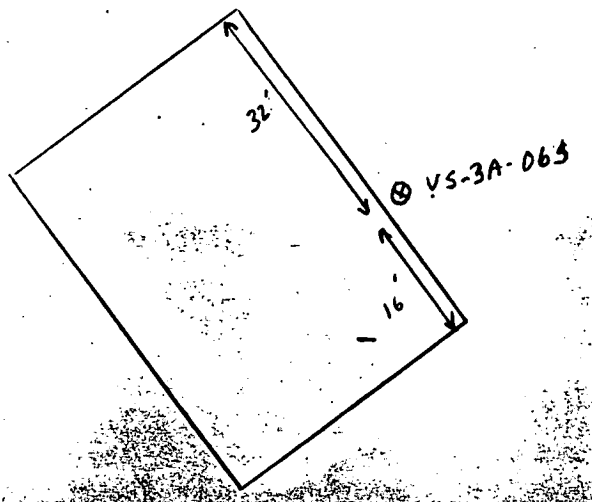
| Color | Description: (Sand, Clay, Dry, Moist, Wet, etc.) |
|---|---|
| Red Brown | Sandy silt with rock fragments and organics mixed in. |

| Analysis | Preservative: |
|---|---|
| [ ] TCL VOAs | dark, 4°C |
| [ ] TCL SVOAs | dark, 4°C |
| [ ] TCL Pest/PCBs | dark, 4°C |
| [ ] TAL Metals | 4°C |
| [ ] Cyanide | 4°C |
| [x] Anthracene, Benzo(a) Anthracene, Benzo(a) pyrene, Fluoranthene | 4°C |

**Observations and Notes**

- [ ] Duplicate sample taken

Sample Location Map



**ATTACHMENT 2**

# QUANTERRA INCORPORATED

## PRELIMINARY DATA SUMMARY

The results shown below may still require additional laboratory review and are subject to change. Actions taken based on these results are the responsibility of the data user.

**Tetra Tech NUS, Inc**
NAWC WARMINSTER, PENNSYLVANIA
Project Number: CTO NO. 0252



**Lot #:** C8J240154 **Date Reported:** 10/29/98

**Client Sample ID: VS-3A-01S**
Sample #: 001 Date Sampled: 10/23/98 09:15 Date Received: 10/24/98 Matrix: SOLID

| PARAMETER | RESULT | REPORTING LIMIT | UNITS | ANALYTICAL METHOD | |
|---|---|---|---|---|---|
| Semivolatile Organic Compounds by GC/MS | | | | | Reviewed |
| Acenaphthene | ND | 380 | ug/kg | SW846 8270C | |
| **Acenaphthylene** | **120 J** | **380** | **ug/kg** | **SW846 8270C** | |
| **Anthracene** | **140 J** | **380** | **ug/kg** | **SW846 8270C** | |
| **Benzo(a)anthracene** | **610** | **380** | **ug/kg** | **SW846 8270C** | |
| **Benzo(b)fluoranthene** | **800** | **380** | **ug/kg** | **SW846 8270C** | |
| **Benzo(k)fluoranthene** | **590** | **380** | **ug/kg** | **SW846 8270C** | |
| **Benzo(ghi)perylene** | **150 J** | **380** | **ug/kg** | **SW846 8270C** | |
| **Benzo(a)pyrene** | **650** | **380** | **ug/kg** | **SW846 8270C** | |
| **Chrysene** | **730** | **380** | **ug/kg** | **SW846 8270C** | |
| **Dibenz(a,h)anthracene** | **63 J** | **380** | **ug/kg** | **SW846 8270C** | |
| **Fluoranthene** | **1500** | **380** | **ug/kg** | **SW846 8270C** | |
| **Fluorene** | **41 J** | **380** | **ug/kg** | **SW846 8270C** | |
| **Indeno(1,2,3-cd)pyrene** | **200 J** | **380** | **ug/kg** | **SW846 8270C** | |
| Naphthalene | ND | 380 | ug/kg | SW846 8270C | |
| **Phenanthrene** | **700** | **380** | **ug/kg** | **SW846 8270C** | |
| **Pyrene** | **940** | **380** | **ug/kg** | **SW846 8270C** | |

Results and reporting limits have been adjusted for dry weight.

J Estimated result. Result is less than RL.

| | | | | |
|---|---|---|---|---|
| Inorganic Analysis | | | | Reviewed |
| **Total Residue as Percent Solids** | **86.6** | | **%** | **MCAWW 160.3 MOD** |

**Client Sample ID: VS-3A-02S**
Sample #: 002 Date Sampled: 10/23/98 09:22 Date Received: 10/24/98 Matrix: SOLID

| | | | | | |
|---|---|---|---|---|---|
| Semivolatile Organic Compounds by GC/MS | | | | | Reviewed |
| Acenaphthene | ND | 760 | ug/kg | SW846 8270C | |
| **Acenaphthylene** | **89 J** | **760** | **ug/kg** | **SW846 8270C** | |
| **Anthracene** | **220 J** | **760** | **ug/kg** | **SW846 8270C** | |
| **Benzo(a)anthracene** | **1200** | **760** | **ug/kg** | **SW846 8270C** | |
| **Benzo(b)fluoranthene** | **1300** | **760** | **ug/kg** | **SW846 8270C** | |
| **Benzo(k)fluoranthene** | **1000** | **760** | **ug/kg** | **SW846 8270C** | |
| **Benzo(ghi)perylene** | **320 J** | **760** | **ug/kg** | **SW846 8270C** | |
| **Benzo(a)pyrene** | **1200** | **760** | **ug/kg** | **SW846 8270C** | |

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# QUANTERRA INCORPORATED

## PRELIMINARY DATA SUMMARY

The results shown below may still require additional laboratory review and are subject to change. Actions taken based on these results are the responsibility of the data user.

Tetra Tech NUS, Inc
NAWC WARMINSTER, PENNSYLVANIA
Project Number: CTO NO. 0252



Lot #: C8J240154 Date Reported: 10/29/98

**Client Sample ID: VS-3A-02S**
Sample #: 002 Date Sampled: 10/23/98 09:22 Date Received: 10/24/98 Matrix: SOLID

| PARAMETER | RESULT | REPORTING LIMIT | UNITS | ANALYTICAL METHOD | |
|---|---|---|---|---|---|
| Semivolatile Organic Compounds by GC/MS | | | | | Reviewed |
| **Chrysene** | **1100** | **760** | **ug/kg** | **SW846 8270C** | |
| **Dibenz(a,h)anthracene** | **99 J** | **760** | **ug/kg** | **SW846 8270C** | |
| **Fluoranthene** | **2600** | **760** | **ug/kg** | **SW846 8270C** | |
| Fluorene | ND | 760 | ug/kg | SW846 8270C | |
| **Indeno(1,2,3-cd)pyrene** | **380 J** | **760** | **ug/kg** | **SW846 8270C** | |
| Naphthalene | ND | 760 | ug/kg | SW846 8270C | |
| **Phenanthrene** | **520 J** | **760** | **ug/kg** | **SW846 8270C** | |
| **Pyrene** | **1700** | **760** | **ug/kg** | **SW846 8270C** | |

Results and reporting limits have been adjusted for dry weight.

J Estimated result. Result is less than RL.

| | | | | | |
|---|---|---|---|---|---|
| Inorganic Analysis | | | | | Reviewed |
| **Total Residue as Percent Solids** | **87.2** | | **%** | **MCAWW 160.3 MOD** | |

**Client Sample ID: VS-3A-03S**
Sample #: 003 Date Sampled: 10/23/98 09:28 Date Received: 10/24/98 Matrix: SOLID

| | | | | | |
|---|---|---|---|---|---|
| Semivolatile Organic Compounds by GC/MS | | | | | Reviewed |
| Acenaphthene | ND | 760 | ug/kg | SW846 8270C | |
| **Acenaphthylene** | **66 J** | **760** | **ug/kg** | **SW846 8270C** | |
| **Anthracene** | **65 J** | **760** | **ug/kg** | **SW846 8270C** | |
| **Benzo(a)anthracene** | **340 J** | **760** | **ug/kg** | **SW846 8270C** | |
| **Benzo(b)fluoranthene** | **470 J** | **760** | **ug/kg** | **SW846 8270C** | |
| **Benzo(k)fluoranthene** | **410 J** | **760** | **ug/kg** | **SW846 8270C** | |
| **Benzo(ghi)perylene** | **110 J** | **760** | **ug/kg** | **SW846 8270C** | |
| **Benzo(a)pyrene** | **400 J** | **760** | **ug/kg** | **SW846 8270C** | |
| **Chrysene** | **430 J** | **760** | **ug/kg** | **SW846 8270C** | |
| Dibenz(a,h)anthracene | ND | 760 | ug/kg | SW846 8270C | |
| **Fluoranthene** | **790** | **760** | **ug/kg** | **SW846 8270C** | |
| Fluorene | ND | 760 | ug/kg | SW846 8270C | |
| **Indeno(1,2,3-cd)pyrene** | **130 J** | **760** | **ug/kg** | **SW846 8270C** | |
| Naphthalene | ND | 760 | ug/kg | SW846 8270C | |
| **Phenanthrene** | **330 J** | **760** | **ug/kg** | **SW846 8270C** | |
| **Pyrene** | **590 J** | **760** | **ug/kg** | **SW846 8270C** | |

(Continued on next page)

# QUANTERRA INCORPORATED

## PRELIMINARY DATA SUMMARY

The results shown below may still require additional laboratory review and are subject to change. Actions taken based on these results are the responsibility of the data user.

Lot #: C8J240154

Tetra Tech NUS, Inc
NAWC WARMINSTER, PENNSYLVANIA
Project Number: CTO NO. 0252



Date Reported: 10/29/98

**Client Sample ID: VS-3A-03S**
Sample #: 003 Date Sampled: 10/23/98 09:28 Date Received: 10/24/98 Matrix: SOLID

Semivolatile Organic Compounds by GC/MS — Reviewed

Results and reporting limits have been adjusted for dry weight.
J Estimated result. Result is less than RL.

Inorganic Analysis — R viewed

| PARAMETER | RESULT | REPORTING LIMIT | UNITS | ANALYTICAL METHOD |
|---|---|---|---|---|
| **Total Residue as Percent Solids** | **87.3** | | **%** | **MCAWW 160.3 MOD** |

**Client Sample ID: VS-3A-04S**
Sample #: 004 Date Sampled: 10/23/98 09:43 Date Received: 10/24/98 Matrix: SOLID

Semivolatile Organic Compounds by GC/MS — Reviewed

| PARAMETER | RESULT | REPORTING LIMIT | UNITS | ANALYTICAL METHOD |
|---|---|---|---|---|
| **Acenaphthene** | **1300 J** | **3700** | **ug/kg** | **SW846 8270C** |
| Acenaphthylene | ND | 3700 | ug/kg | SW846 8270C |
| **Anthracene** | **2300 J** | **3700** | **ug/kg** | **SW846 8270C** |
| **Benzo(a)anthracene** | **5700** | **3700** | **ug/kg** | **SW846 8270C** |
| **Benzo(b)fluoranthene** | **7100** | **3700** | **ug/kg** | **SW846 8270C** |
| **Benzo(k)fluoranthene** | **5900** | **3700** | **ug/kg** | **SW846 8270C** |
| **Benzo(ghi)perylene** | **1100 J** | **3700** | **ug/kg** | **SW846 8270C** |
| **Benzo(a)pyrene** | **5700** | **3700** | **ug/kg** | **SW846 8270C** |
| **Chrysene** | **6100** | **3700** | **ug/kg** | **SW846 8270C** |
| **Dibenz(a,h)anthracene** | **380 J** | **3700** | **ug/kg** | **SW846 8270C** |
| **Fluoranthene** | **19000** | **3700** | **ug/kg** | **SW846 8270C** |
| **Fluorene** | **1200 J** | **3700** | **ug/kg** | **SW846 8270C** |
| **Indeno(1,2,3-cd)pyrene** | **1500 J** | **3700** | **ug/kg** | **SW846 8270C** |
| Naphthalene | ND | 3700 | ug/kg | SW846 8270C |
| **Phenanthrene** | **14000** | **3700** | **ug/kg** | **SW846 8270C** |
| **Pyrene** | **14000** | **3700** | **ug/kg** | **SW846 8270C** |

J Estimated result. Result is less than RL.
Results and reporting limits have been adjusted for dry weight.

Inorganic Analysis — Reviewed

| PARAMETER | RESULT | REPORTING LIMIT | UNITS | ANALYTICAL METHOD |
|---|---|---|---|---|
| **Total Residue as Percent Solids** | **89.4** | | **%** | **MCAWW 160.3 MOD** |

(Continued on next page)

# QUANTERRA INCORPORATED

# PRELIMINARY DATA SUMMARY

The results shown below may still require additional laboratory review and are subject to change. Actions taken based on these results are the responsibility of the data user.

Tetra Tech NUS, Inc
NAWC WARMINSTER, PENNSYLVANIA
Project Number: CTO NO. 0252



Lot #: C8J240154 Date Reported: 10/29/98

**Client Sample ID: VS-3A-05S**
Sample #: 005 Date Sampled: 10/23/98 09:49 Date Received: 10/24/98 Matrix: SOLID

Semivolatile Organic Compounds by GC/MS — Reviewed

| PARAMETER | RESULT | REPORTING LIMIT | UNITS | ANALYTICAL METHOD |
|---|---|---|---|---|
| **Acenaphthene** | **2000 J** | **7400** | **ug/kg** | **SW846 8270C** |
| Acenaphthylene | ND | 7400 | ug/kg | SW846 8270C |
| **Anthracene** | **5400 J** | **7400** | **ug/kg** | **SW846 8270C** |
| **Benzo(a)anthracene** | **13000** | **7400** | **ug/kg** | **SW846 8270C** |
| **Benzo(b)fluoranthene** | **10000** | **7400** | **ug/kg** | **SW846 8270C** |
| **Benzo(k)fluoranthene** | **12000** | **7400** | **ug/kg** | **SW846 8270C** |
| **Benzo(ghi)perylene** | **1600 J** | **7400** | **ug/kg** | **SW846 8270C** |
| **Benzo(a)pyrene** | **9600** | **7400** | **ug/kg** | **SW846 8270C** |
| **Chrysene** | **12000** | **7400** | **ug/kg** | **SW846 8270C** |
| Dibenz(a,h)anthracene | ND | 7400 | ug/kg | SW846 8270C |
| **Fluoranthene** | **36000** | **7400** | **ug/kg** | **SW846 8270C** |
| **Fluorene** | **1800 J** | **7400** | **ug/kg** | **SW846 8270C** |
| **Indeno(1,2,3-cd)pyrene** | **2100 J** | **7400** | **ug/kg** | **SW846 8270C** |
| Naphthalene | ND | 7400 | ug/kg | SW846 8270C |
| **Phenanthrene** | **22000** | **7400** | **ug/kg** | **SW846 8270C** |
| **Pyrene** | **28000** | **7400** | **ug/kg** | **SW846 8270C** |

J Estimated result. Result is less than RL.

Results and reporting limits have been adjusted for dry weight.

Inorganic Analysis — Reviewed

| | | | | |
|---|---|---|---|---|
| **Total Residue as Percent Solids** | **89.2** | | **%** | **MCAWW 160.3 MOD** |

**Client Sample ID: VS-3A-06S**
Sample #: 006 Date Sampled: 10/23/98 09:53 Date Received: 10/24/98 Matrix: SOLID

Semivolatile Organic Compounds by GC/MS — Reviewed

| | | | | |
|---|---|---|---|---|
| Acenaphthene | ND | 380 | ug/kg | SW846 8270C |
| **Acenaphthylene** | **33 J** | **380** | **ug/kg** | **SW846 8270C** |
| **Anthracene** | **100 J** | **380** | **ug/kg** | **SW846 8270C** |
| **Benzo(a)anthracene** | **480** | **380** | **ug/kg** | **SW846 8270C** |
| **Benzo(b)fluoranthene** | **580** | **380** | **ug/kg** | **SW846 8270C** |
| **Benzo(k)fluoranthene** | **590** | **380** | **ug/kg** | **SW846 8270C** |
| **Benzo(ghi)perylene** | **110 J** | **380** | **ug/kg** | **SW846 8270C** |
| **Benzo(a)pyrene** | **490** | **380** | **ug/kg** | **SW846 8270C** |

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# QUANTERRA INCORPORATED

# PRELIMINARY DATA SUMMARY

The results shown below may still require additional laboratory review and are subject to change. Actions taken based on these results are the responsibility of the data user.

Tetra Tech NUS, Inc — PAGE 5

Lot #: C8J240154 — NAWC WARMINSTER, PENNSYLVANIA — Date Reported: 10/29/98

Project Number: CTO NO. 0252

**Client Sample ID: VS-3A-06S**

Sample #: 006 Date Sampled: 10/23/98 09:53 Date Received: 10/24/98 Matrix: SOLID

| PARAMETER | RESULT | REPORTING LIMIT | UNITS | ANALYTICAL METHOD | |
|---|---|---|---|---|---|
| Semivolatile Organic Compounds by GC/MS | | | | | Reviewed |
| **Chrysene** | **510** | **380** | **ug/kg** | **SW846 8270C** | |
| **Dibenz(a,h)anthracene** | **35 J** | **380** | **ug/kg** | **SW846 8270C** | |
| **Fluoranthene** | **1200** | **380** | **ug/kg** | **SW846 8270C** | |
| **Fluorene** | **28 J** | **380** | **ug/kg** | **SW846 8270C** | |
| **Indeno(1,2,3-cd)pyrene** | **140 J** | **380** | **ug/kg** | **SW846 8270C** | |
| Naphthalene | ND | 380 | ug/kg | SW846 8270C | |
| **Phenanthrene** | **460** | **380** | **ug/kg** | **SW846 8270C** | |
| **Pyrene** | **920** | **380** | **ug/kg** | **SW846 8270C** | |

Results and reporting limits have been adjusted for dry weight.

J Estimated result. Result is less than RL.

| | | | | | |
|---|---|---|---|---|---|
| Inorganic Analysis | | | | | Reviewed |
| **Total Residue as Percent Solids** | **87.5** | | **%** | **MCAWW 160.3 MOD** | |

**Client Sample ID: VS-3A-20S**

Sample #: 007 Date Sampled: 10/23/98 09:53 Date Received: 10/24/98 Matrix: SOLID

| | | | | | |
|---|---|---|---|---|---|
| Semivolatile Organic Compounds by GC/MS | | | | | Reviewed |
| Acenaphthene | ND | 1500 | ug/kg | SW846 8270C | |
| Acenaphthylene | ND | 1500 | ug/kg | SW846 8270C | |
| Anthracene | ND | 1500 | ug/kg | SW846 8270C | |
| **Benzo(a)anthracene** | **590 J** | **1500** | **ug/kg** | **SW846 8270C** | |
| **Benzo(b)fluoranthene** | **720 J** | **1500** | **ug/kg** | **SW846 8270C** | |
| **Benzo(k)fluoranthene** | **830 J** | **1500** | **ug/kg** | **SW846 8270C** | |
| **Benzo(ghi)perylene** | **180 J** | **1500** | **ug/kg** | **SW846 8270C** | |
| **Benzo(a)pyrene** | **700 J** | **1500** | **ug/kg** | **SW846 8270C** | |
| **Chrysene** | **630 J** | **1500** | **ug/kg** | **SW846 8270C** | |
| Dibenz(a,h)anthracene | ND | 1500 | ug/kg | SW846 8270C | |
| **Fluoranthene** | **1100 J** | **1500** | **ug/kg** | **SW846 8270C** | |
| Fluorene | ND | 1500 | ug/kg | SW846 8270C | |
| **Indeno(1,2,3-cd)pyrene** | **190 J** | **1500** | **ug/kg** | **SW846 8270C** | |
| Naphthalene | ND | 1500 | ug/kg | SW846 8270C | |
| **Phenanthrene** | **360 J** | **1500** | **ug/kg** | **SW846 8270C** | |
| **Pyrene** | **1100 J** | **1500** | **ug/kg** | **SW846 8270C** | |

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# QUANTERRA INCORPORATED

## PRELIMINARY DATA SUMMARY

The results shown below may still require additional laboratory review and are subject to change. Actions taken based on these results are the responsibility of the data us r.

Lot #: C8J240154

Tetra Tech NUS, Inc
NAWC WARMINSTER, PENNSYLVANIA
Project Number: CTO NO. 0252



Date Reported: 10/29/98

| PARAMETER | RESULT | REPORTING LIMIT | UNITS | ANALYTICAL METHOD | |
|---|---|---|---|---|---|
| **Client Sample ID: VS-3A-20S** | | | | | |
| Sample #: 007 Date Sampled: 10/23/98 09:53 Date Received: 10/24/98 Matrix: SOLID | | | | | |
| Semivolatile Organic Compounds by GC/MS | | | | | Reviewed |

Results and reporting limits have been adjusted for dry weight.
J Estimated result. Result is less than RL.

| | | | | | |
|---|---|---|---|---|---|
| Inorganic Analysis | | | | | Reviewed |
| **Total Residue as Percent Solids** | 88.2 | | % | MCAWW 160.3 MOD | |

| | | | | | |
|---|---|---|---|---|---|
| **Client Sample ID: W-RB-102398** | | | | | |
| Sample #: 008 Date Sampled: 10/23/98 11:00 Date Received: 10/24/98 Matrix: WATER | | | | | |
| Semivolatile Organic Compounds by GC/MS | | | | | Reviewed |
| Naphthalene | ND | 10 | ug/L | SW846 8270C | |
| Acenaphthylene | ND | 10 | ug/L | SW846 8270C | |
| Acenaphthene | ND | 10 | ug/L | SW846 8270C | |
| Fluorene | ND | 10 | ug/L | SW846 8270C | |
| Phenanthrene | ND | 10 | ug/L | SW846 8270C | |
| Anthracene | ND | 10 | ug/L | SW846 8270C | |
| Fluoranthene | ND | 10 | ug/L | SW846 8270C | |
| Pyrene | ND | 10 | ug/L | SW846 8270C | |
| Benzo(a)anthracene | ND | 10 | ug/L | SW846 8270C | |
| Chrysene | ND | 10 | ug/L | SW846 8270C | |
| Benzo(b)fluoranthene | ND | 10 | ug/L | SW846 8270C | |
| Benzo(k)fluoranthene | ND | 10 | ug/L | SW846 8270C | |
| Benzo(a)pyrene | ND | 10 | ug/L | SW846 8270C | |
| Indeno(1,2,3-cd)pyrene | ND | 10 | ug/L | SW846 8270C | |
| Dibenzo(a,h)anthracene | ND | 10 | ug/L | SW846 8270C | |
| Benzo(ghi)perylene | ND | 10 | ug/L | SW846 8270C | |

**ATTACHMENT 3**

# TABLE

## RME EXPOSURE POINT CONCENTRATION AND STATISTICAL DISTRIBUTION OF COPCS IN SOIL
## AREA A, SITE 3A, SOIL DATA
## NAWC WARMINSTER, PENNSYLVANIA

| Substance | Number of Sample Results | Degrees of Freedom | Statistical Distribution of Site Data | Results of Shapiro-Wilk or Shapiro-Francia Distribution Tests | | | Table Value for $H_{0.95}$ (Lognorm.) or $T_{0.95}$ (Normal) | Standard Deviation or Log Standard Deviation | Arithmetic Mean of All Site Results | Upper 95 % Confidence Limit (UCL) on Mean | Maximum Positive Site Concentration | Representative Concentration (Lower of UCL vs Max) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | W-norm. | W-lognorm | W-Table | | | | | | |
| Anthracene | 6 | 5 | *lognormal | 0.7071 | 0.8589 | 0.788 | 7.024 | 1.82 | 1370 | 573000 | 5400 | 5400 |
| Benz(a)anthracene | 6 | 5 | *lognormal | 0.7221 | 0.8405 | 0.788 | 5.5657 | 1.41 | 3580 | 138000 | 13000 | 13000 |
| Benzo(a)pyrene | 6 | 5 | *lognormal | 0.7516 | 0.8355 | 0.788 | 5.1076 | 1.28 | 3030 | 64200 | 9600 | 9600 |
| Fluoranthene | 6 | 5 | *lognormal | 0.7321 | 0.84 | 0.788 | 6.0384 | 1.54 | 10200 | 810000 | 36000 | 36000 |
| | | | | | | | | | | | | |

Notes:

Units are mg/kg.
Number of sample results excludes rejected data or blank-qualified data. Duplicates are consolidated into one result. Non-detected results are treated as present at one-half the detection limit in all calculations.
Statistical distribution of data is determined using Shapiro-Wilk test for n <= 50, Shapiro-Francia test for n > 50. Statistical significance level is 0.05.
For N>10, a normal distribution is assumed if the test statistic W-norm. is >= than the reference value (W-table), and W-norm. > W-lognorm.
For N>=10, a lognormal distribution is assumed if the test statistic W-lognorm. is >= the reference value (W-table), and W-lognorm. >= W-norm. A lognormal distribution is assumed if neither distribution is >= the reference value.
*For N<10, the maximum concentration is selected as the representative concentration, although the fitted distribution type is shown for information only.
H-values and standard deviations of log-transformed data are used to calculate the UCL if data are assumed to be lognormally distributed. Student's T-values and standard deviations are used for normally distributed data.
Arithmetic mean includes positive detections and non-detected results (detection limits are divided by two).
The representative concentration is selected as the lower of the 95 % UCL on the mean and the maximum positive site concentration.

| SAMPLES: |
| --- |
| VS-3A-01S |
| VS-3A-02S |
| VS-3A-03S |
| VS-3A-03S-DUP |
| VS-3A-04S |
| VS-3A-05S |
| VS-3A-06S |