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DATA VALIDATION REPORT FOR THE NAVAL SUBMARINE BASE SITE IN GROTON, CT LOWER SUBBASE GROUNDWATER SAMPLES COC NOS: N126, N127, N128

Prepared for:

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META

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DATA VALIDATION REPORT

RE: COC Nº: N126, N127, N128
Site: Naval Submarine Base, Groton, CT
Reference: NVDV930503G

Volatiles: 6/aqueous/13MW1S, 13MW3S, 13MW4S, 13MW2S, 13MW5S, 13MW9S.

Inorganics: 6/aqueous/13MW1S, 13MW3S, 13MW4S, 13MW2S, 13MW5S, 13MW9S.

INTRODUCTION

META Environmental, Inc. (META) has completed a validation of the volatile organic and inorganic analytical data from COC Nos. N126, N127, and N128 low level aqueous samples collected from the Naval Submarine Base site in Groton, CT. The data were evaluated according to guidelines adapted by META, and based on the U.S. EPA Region I Functional Guidelines for Evaluating Organic Analyses (2/88), the U.S. EPA Region I Functional Guidelines for Evaluating Inorganic Analyses (6/88), and the NEESA Sampling and Chemical Analysis Quality Assurance Requirements for the Navy Installation Restoration Program (20.2-047B).

Triclustered Sample Data Sheets detailing the Contract Required Quantitation Limits (CRQLs), laboratory reported results, instrument detection limits, data validation results, and recommendations for each fraction of every sample have been submitted for your convenience.

The data submitted for COC Nos. N126, N127, and N128 were found to be generally good. There was some qualification of VOA and inorganic data due to blank contamination and instrument calibration.

ORGANIC DATA

Evaluation of the volatile (VOA) organic data was based on the following parameters:

- Data completeness
- ☺ Holding times
- ☺ GC/MS Tuning
- Calibration
- Blanks
- Method blank/spikes
- ☺ Surrogate recoveries
- ☺ Matrix spike/matrix spike duplicate
- Field duplicate precision
- ☺ Internal standard performance
- QC check standard performance
- ☺ Compound identification
- ☺ Compound quantitation

☺ - All criteria were met for this parameter.

Data Completeness

The data package contained all of the forms required by the SOW. In addition to the forms required by the SOW, the following items are necessary for a NEESA compliant data package:

- The analysis of method/blank spikes, and submission of raw data, summary forms, and control charts for those analyses.

Control charts were submitted with the data package, but raw data and summary forms were not submitted. Copy quality was good.

Holding Times

All of the VOA fraction samples were analyzed within the required holding times. No action is recommended.

GC/MS Tuning

All of the BFB and DFTPP tuning criteria were within the required limits.

Calibration

The following problems were noted with the initial and/or continuing calibration of the VOA GC/MS systems:

VOA instrument HP5970G (initial calibration date 01/15/91):

Compound	IC 01/15/91	CC 01/21/91	CC 01/23/91
Acetone	X		
2-Butanone	X	X	X
Associated Samples:	All listed here plus 13MW3S, 13MW5S.	13MW4S, 13MW9S.	13MW4MS/MSD.

X %RSD > 30% or %D > 25%; Estimate (J^3) positive results.
XX %RSD or %D > 50%; Estimate (J^4, UJ^4) positive and non-detected results.
+ RF < 0.05; Estimate (J^2) positive results and reject (R^2) non-detected results.

Blanks

The VOA fraction low level laboratory method blanks, equipment blanks, and trip blank contained the following maximum quantities of contaminants:

Compound	Maximum [ ]	Action Level
Methylene chloride	2 μg/L	20 μg/L
Acetone	11 μg/L	110 μg/L
Bronoform	1 μg/L	5 μg/L
4-Methyl-2-pentanone	3 μg/L	15 μg/L
2-Hexanone	4 μg/L	20 μg/L
1,1,2,2-Tetrachloroethane	3 μg/L	15 μg/L
Toluene	1 μg/L	10 μg/L

Blank Actions:

- Value < CRQL; report CRQL followed by "U" (U^5).
- Value > CRQL and < action level; report value followed by "U" (U^6).
- Value > CRQL and > action level; report value unqualified.

The action level values were compared to the sample values after application of sample dilution factors, and the following recommendations are made: acetone in samples 13MW2S and 13MW5S should be reported as the CRQL followed by "U" (U^5); and acetone in the samples 13MW4S, 13MW4SMS, and 13MW4SMSD should be reported as the value followed by "U" (U^6) (i.e., the CRQL has been raised and the value is considered to be non-detect).

No TIC compounds were detected in any VOA fraction method, field or trip blank.

In addition, all TIC compounds were flagged on the Forms I in the following way:

"JN" Presumptive evidence for the tentative identification of a compound at an approximate concentration (required flag).

It should be noted that at the request of the client, none of the field and trip blanks associated with the samples in this case were validated. Field and trip blank results were used as reported by the laboratory on the Forms I, with no evaluation of the accompanying raw data or QC, in order to determine the blank actions applied to the samples.

Method Blank/Spikes

NEESA requires the analysis of method blank/spikes along with the analysis of samples. The results of the method/blank spikes are to be plotted on control charts and submitted with the data package.

For the VOA fraction, the method blank/spike is essentially the same thing as a method blank. The method blanks submitted by the laboratory may be evaluated as method blank/spikes by plotting the surrogate recovery results on a control chart. In compliance with NEESA requirements, the laboratory did submit control charts which plotted the surrogate recoveries.

Surrogate Recoveries

All VOA fraction aqueous surrogate recoveries were within the Contract Required Recovery range (CRR). No action is recommended.

Matrix Spike/Matrix Spike Duplicate

All VOA fraction MS/MSD %Recs and RPDs were within the CRR. No action is recommended.

A comparison of the unspiked compounds present in the sample, MS, and MSD yields the following information:

Compound	Sample	MS	MSD	%RSD
Acetone	23	20	22	7%

The %RSD was less than the criterion of < 30% for waters. No actions are recommended.

Field Duplicate Precision

There were no field duplicate samples submitted with this case.

Internal Standard Performance

All VOA fraction internal standard (IS) areas were within the CRR. No action is recommended.

Compound Identification

In accordance with contractual requirements, mass spectra were submitted for all VOA compounds detected.

Mass spectral identifications were generally good, and all VOA compound RRTs were within ± 0.06 units of the standard RRT.

Compound Quantitation

VOA fraction sample quantitation calculations were performed correctly.

Tentatively Identified Compounds

The TICs identified in the VOA fraction samples are summarized in Table 1.

Data Assessment

This package did not contain any reextraction, reanalysis or dilution. No recommendations are necessary.

INORGANIC DATA

The inorganic data were evaluated based on the following parameters:

- Data completeness
- ☺ Holding times
- ☺ Calibration verification results
- Blank results
- Method blank/spike results
- ☺ Interference check standard results
- Matrix spike results
- Field duplicate results
- ☺ Laboratory duplicate results
- ☺ Laboratory control sample results
- ☺ ICP serial dilution results
- Furnace AA results
- ☺ Instrument detection limits
- ☺ Calculation checks

☺ - all criteria were met for this parameter.

Data Completeness

The data package contained all forms and raw data required by the SOW. In addition to the forms required by the SOW, the following items are necessary for a NEESA compliant data package:

- ▸ The analysis of method/blank spikes, and submission of raw data, summary forms, and control charts for those analyses.

Control charts were submitted with the data package, but raw data and summary forms were not submitted.

In addition, the following items should be noted:

- Pages 20002 to 20030 of the data package had unacceptable copy quality. Those pages were resubmitted by the laboratory.

Copy quality was good.

Holding Times

Holding times were reviewed and found to meet criteria for all parameters. In addition, pH values for all samples were found to meet criteria.

CalibrationVerification Results

Initial and continuing calibration verifications were reviewed and all met the recovery criteria.

There was no CRDL standard analyzed for mercury. The laboratory was compliant, but uncertainty about the detection limit exists. It is recommendedd to flag mercury detection limits as estimated (UJ[15]) in all samples.

The standard at 2 X CRDL for nickel was over-recovered (129.6%, 129.7%, and 144.4%). All results less than 3 X CRDL will be estimated (J[2]). The standard at 2 X CRDL for zinc was over-recovered (134%). All results less than 3 X CRDL will be estimated (J[2]).

Frequency requirements for calibration standards were met for all analyses.

Blank Results

The preparation blank, calibration blanks, and equipment blanks contained low levels of several metals. A table showing the maximum concentration found in any blank with the resultant action levels follows. The action level is calculated as 5X the maximum concentration found in any blank. Sample results less than 5X the maximum concentration found in any blank may be due to contamination or instrumental problems, and thus may not be indicative of the actual concentration of the native sample.

Element	Concentration (μg/L)	Action Level (μg/L)
Aluminum	30.2	151
Antimony	26.3	131.5
Cadmium	2.4	12
Calcium	161	805
Chromium	8.7	43.5
Iron	52.5	262.5
Lead	5	25
Manganese	2.9	14.5
Nickel	22	110
Potassium	726.3	3631.5
Selenium	1.1	5.5
Sodium	1679.1	8395.5
Zinc	13.6	68

The action level values were compared to the sample values after application of sample dilution factors, and sample results less than the action level were reported as not detected (see Sample Data Sheets attached to this report).

It should be noted that at the client's request, none of the field blank samples submitted with this case were validated. The results were used as reported by the laboratory to qualify the sample data, but none of the associated raw or QC data were inspected.

Method Blank/Spike Results

A laboratory control sample (LCS) was analyzed with each batch of field samples. The LCS results were plotted on control charts, and satisfy the NEESA QC requirements for the method blank/spike control program. The LCS results are discussed elsewhere in this report.

Interference Check Standard Results

The ICP interference check sample results were reviewed and all recoveries met required criteria. The ICS solutions were analyzed at the proper frequency. Cadmium, nickel, manganese, zinc, antimony, and potassium were detected in the ICSA solution above the IDL but should not be present. However, the sample concentrations of interferents were less than 50% of the levels in the ICSA solution and no interference is estimated. No action is recommended.

Matrix Spike Results

The metals spike was performed on sample 13MW4S. Recoveries for all analytes but cyanide met the required criteria. For cyanide, the spike was under-recovered and it is recommended to estimate the cyanide detection limit in all samples (UJ[5]).

Field Duplicate Results

No field duplicates were identified.

Laboratory Duplicate Results

The metals duplicate was performed on sample 13MW4S. Duplicate precision for all analytes met the required criteria.

Laboratory Control Sample Results

The laboratory control sample (LCS) results were reviewed, and the criteria were met for all parameters.

ICP Serial Dilution Results

Sample 13MW4S was used for the serial dilution. Analytical results agreed within 10% for analyte concentrations greater than 50 X IDL before dilution. No action is recommended.

Furnace AA Results

Furnace AA QC data were reviewed. Duplicate injections and one-point analytical spikes were performed for each sample and analyte. Duplicate injections did not agree within ± 20% for the selenium spike of sample 13MW9S. The analysis was repeated with similar results, and results were flagged by the laboratory accordingly. The selenium result for sample 13MW9S should be considered estimated (J^9).

Analytical spike recoveries for lead, selenium, and thallium in sample 13MW9S did not meet the ± 15% criterion. The lead and thallium results are non-detect and the recovery is within the 11 to 84% window. Therefore, the non-detected results will be estimated (UJ^{10}). In addition, the positive selenium result in 13MW9S will be estimated (J^{10}).

Instrument Detection Limits

Instrument detection limits (IDLs) were reviewed and found to meet all criteria.

Calculation and Transcriptions

A spot check of calculations and transcriptions was performed and no problems were detected.

Data Assessment

This package does not contain any reextraction, reanalysis, or dilution. No recommendations are necessary.

Organic and Inorganic Sections prepared by:

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TABLE 1:

TENTATIVELY IDENTIFIED COMPOUND SUMMARY

Table 1

META Environmental, Inc.
Tentatively Identified Compound Summary

Sample/TIC	13MW2S	13MW4S
Propylbenzene	X	
Methylpropylbenzene isomer	X	
Ethynylmethylbenzene isomer	X	
Dimethylethylbenzene isomer		X

X = Tentatively Identified Compound (TIC) of this description was found in the sample.

META

GLOSSARY OF TERMS

GLOSSARY OF TERMS

(In alphabetical order)

ABN	Acid/Base-Neutral. An extraction and analytical method for the determination of semivolatile organic compounds, or a sample extracted and analyzed by that method. Also: BNA, semivolatile, SVOC.
ASP	Analytical Services Protocol. The NYSDEC statement of work.
BFB	Bromofluorobenzene. The compound used for initial tuning of the GC/MS system, prior to the analysis of volatile organic compounds.
CC	Continuing Calibration. A standard solution of organic compounds of known concentration is analyzed periodically to check the continued calibration of the system.
CF	Calibration Factor. In pesticide/PCB analyses, the calibration factor is the area of the standard compound divided by the concentration of that compound in the standard.
CCC	Calibration Check Compound. Any one of a defined subgroup of compounds present in the calibration standards. Used to check the acceptability of instrument performance.
CCV	Continuing Calibration Verfication. A standard solution of inorganic compounds of known concentration is analyzed periodically during sample analyses to verify the continued calibration of the instrument.
CLP	Contract Laboratory Program. The U.S. EPA program that defines analytical, QC, and reporting procedures to generate high quality, defensible data. CLP also has associated the most highly developed and regulated set of data validation guidelines, on which most data validation decisions are based.
COC	Chain of Custody. The documentation that details the history of a given sample, from the time it is collected until the time it has been analyzed.
CRDL	Contract Required Detection Limit. As defned by the U.S. EPA CLP, the minimum concentration at which the laboratory must be able to **accurately** quantitate the inorganic analyte of interest. Results below the CRDL are reported, but as estimated values.

GLOSSARY OF TERMS

CRQL	Contract Required Quantitation Limit. As defined by the U.S. EPA CLP, the minimum concentration at which the laboratory must be able to **accurately** quantitate the organic compound of interest. Results below the CRQL are reported, but as estimated values.
CRR	Contract Required Recovery range. As defined in the U.S. EPA Region I Functional Guidelines for Evaluating Organics Analyses (11/88), the acceptable recovery range for surrogate spike and matrix spike compounds.
DFTPP	Decafluorotriphenylphosphine. The compound used for initial tuning of the GC/MS system, prior to the analysis of semivolatile organic compounds.
EICP	Extracted Ion Current Profiles. Recommended by the U.S. EPA CLP and required by the NYSDEC ASP, the EICP displays the chromatographic peak specific to a m/z ion in a GC/MS analysis.
EPA	Environmental Protection Agency. The United States federal agency governing environmental concerns.
FP	False Positive. Used to designate as non-detect any compound incorrectly identified by the computer.
GC/MS	Gas Chromatography/Mass Spectrometry. An analytical technique used commonly for the determination of volatile and semivolatile organic compounds.
HT	Holding Time. The contractually defined time in which a sample must be extracted and/or analyzed by the analytical laboratory. Generally calculated from date of sampling.
IC	Initial Calibration. A series of standard solutions of organic compounds are analyzed at different concentration levels to define the initial linearity of the analytical system.
ICV	Initial Calibration Verification. A standard solution of inorganic compounds is analyzed immediately following instrument calibration to confirm the accuracy of that calibration.

GLOSSARY OF TERMS

IDL — Instrument Detection Limit. The lowest concentration at which a particular instrument can reliably detect a given analyte. As differs from the CRQL which is the lowest concentration at which a given analyte may be reliably quantitated. IDLs vary from instrument to instrument, and their determination is required by NYSDEC.

MS/MSD — Matrix Spike/Matrix Spike Duplicate. Prior to extraction, a known quantity of several analytes is spiked into a sample. The sample is analyzed in duplicate and %Recs and RPDs are calculated. Used to monitor matrix effects of the native sample upon the observed sample results.

MSB — Matrix Spike Blank. An aliquot of contaminant-free soil or water is spiked with a known quantity of several analytes. The MSB is analyzed and %Recs are calculated. Required by NYSDEC.

NEESA — Naval Energy and Environmental Support Activity. The regulatory agency for the Navy Installation Restoration Program.

NYSDEC — New York State Department of Environmental Conservation. The New York State agency governing environmental concerns.

%D — Percent Difference. A measure of the variance between two results, relative to the first result.

$$\%D = \frac{R_1 - R_2}{R_2} \times 100$$

where, R_1 is the first result and R_2 is the second result.

%Rec — Percent Recovery. A measure of the recovery of a known amount of analyte.

$$\%Rec = \frac{A_r}{A_s} \times 100$$

where, A_r is the amount recovered and A_s is the amount spiked. (When calculating matrix spike recoveries, the amount of analyte present in the unspiked sample must first be subtracted from the amount recovered).

GLOSSARY OF TERMS

%RSD — Percent Relative Standard Deviation. A measure of the variance between multiple results.

$$\%RSD = \frac{SD}{X} \times 100$$

where, SD is the standard deviation and X is the mean of the values.

PEST — Pesticide/PCB. An extraction and analytical method for the detremination of pesticide and/or PCB compounds, or a sample extracted and analyzed by that method. Also: Pest/PCB, PCB.

QA — Quality Assurance. The system of management that guarantees high quality data output.

QC — Quality Control. Any system of analytical tests and checks that monitors the progress of the data, leading to high quality data output. May also refer to the criteria by which those tests and checks are evaluated.

RPD — Relative Percent Difference. A measure of precision comparing two results.

$$RPD = \frac{D_1 - D_2}{(D_1 + D_2)/2} \times 100$$

where, D_1 is the result from sample 1 and D_2 is the result from sample 2.

RRF — Relative Response Factor. A measure of the response of the instrument to a given compound relative to the response of the instrument to a standard compound.

RT — Retention Time. In GC, the time it takes for a given analyte to move through the analytical system to the detector.

SD — Standard Deviation. In statistics, the standard deviation is a measure of the dispersion of all values around the mean value.

GLOSSARY OF TERMS

$$SD = \frac{\sqrt{(n\Sigma x^2 - (\Sigma x)^2)}}{n(n-1)}$$

where n = number of values and x = individual values.

SOW — Statement of Work. A document describing in detail the contractual obligations of the laboratory to the contractor with regards to analytical methods, reporting requirements, and QC, financial, and litigational obligations.

TAL — Target Analyte List. The list that defines the specific inorganic parameters of interest in a given analysis.

TCL — Target Compound List. The list that defines the specific organic compounds of interest in a given analysis.

TIC — Tentatively Identified Compound. Any non-TCL compound which is detected during sample analysis and identified by mass spectral matching alone.

VOA — Volatile Organic Compound Analysis. An analytical method for the determination of volatile organic compounds, or a sample analyzed by that method. Also: VOC.

VTSR — Verified Time of Sample Receipt. The date and time a group of samples is accepted at the analytical laboratory. Appears on the COC. NYSDEC calculates holding times from VTSR rather than from sampling date.

DATA VALIDATION RECOMMENDATION FOOTNOTES - ORGANICS

DATA VALIDATION RECOMMENDATION FOOTNOTES

____	A blank space denotes no change to the laboratory reported result.
J^1, UJ^1	Holding times have been exceeded: estimate positive results (J^1) and non-detects (UJ^1). Refer to Section on "Holding Times" for details.
J^2, R^2	The initial or continuing calibration RF was low: estimate positive results (J^2) and reject non-detects (R^2). Refer to Section on GC/MS "Calibration" for details.
J^3	The initial calibration %RSD was high: estimate positive results (J^3). Refer to Section on GC/MS "Calibration" for details.
J^4, UJ^4	The initial calibration %RSD was greater than 50% or the continuing calibration %D was greater than 25%: estimate positive results (J^4) and non-detects (UJ^4). Refer to Section on GC/MS "Calibration" for details.
U^5	Compound was present in the associated blank. Compound is present in the sample at a concentration less than the CRQL: report the CRQL (U^5). Refer to Section on "Blanks" for details.
U^6	Compound was present in the associated blank. Compound was present in the sample at a concentration higher than the CRQL but lower than the "action level": qualify the result by reporting the value followed by "U" (U^6). (i.e., the Limit of Detection has been raised for that compound, and the result is considered to be non-detect). Refer to Section on "Blanks" for details.
J^7	One or more of the surrogate standard %Recs was greater than the Contract Required Recovery range (CRR): estimate positive results within that area of the chromatogram (J^7). Refer to Section on "Surrogate Recoveries" for details.
J^8, UJ^8	One or more of the surrogate standard %Recs was less than the CRR: estimate positive results (J^8) and non-detects (UJ^8) within that area of the chromatogram. Refer to Section on "Surrogate Recoveries" for details.
J^9	One or more of the surrogate standard %Recs was less than 10%: estimate positive results (J^9) and reject non-detects (R^3) within that area of the chromatogram. Refer to Section on "Surrogate Recoveries" for details.

DATA VALIDATION RECOMMENDATION FOOTNOTES

J^{10} The Matrix Spike (MS) and/or Matrix Spike Duplicate (MSD) %Recs were not within the CRR for this compound: estimate positive results in the unspiked sample (J^{10}). Refer to Section on "Matrix Spike/Matrix Spike Duplicate" for details.

J^{11} The MS and/or MSD %Recs were less than 10% for this compound: estimate positive results in the unspiked sample (J^{11}) and reject non-detects (R^4). Refer to Section on "Matrix Spike/Matrix Spike Duplicate" for details.

J^{12} The MS/MSD %RPD for this compound was high: estimate positive results in the unspiked sample (J^{12}). Refer to Section on "Matrix Spike/Matrix Spike Duplicate" for details.

J^{13} Field duplicate %RPD was high for this compound: estimate positive results for this compound in the sample and duplicate (J^{13}). Refer to Section on "Field Duplicates" for details.

J^{14}, UJ^{14} One value was non-detect and the other value was greater than the CRQL for this compound in the field duplicate pair: estimate the positive (J^{14}) and non-detected (UJ^{14}) results for that compound. Refer to Section on "Field Duplicates" for details.

J^{15}, UJ^{15} One or more Internal Standard (IS) areas were not within the CRR: estimate positive results (J^{15}) and non-detects (UJ^{15}) for all compounds quantitated from that IS. Refer to Section on "Internal Standard Performance" for details.

J^{16}, R^5 One or more IS areas were grossly low: estimate (J^{16}) positive results and reject (R^5) non-detected results for all compounds quantitated from that IS. Refer to Section on "Internal Standard Performance" for details.

J^{17}, JN^{17}, R^6 % Breakdown for DDT exceeded 20%: estimate positive results for DDT (J^{17}), DDD, and DDE (JN^{17}) in all associated samples. If no DDT is present, but DDD and/or DDE are present: reject the CRQL (R^6) for DDT. Refer to Section on "Pesticide Instrument Performance" for details.

J^{18}, JN^{18}, R^7 % Breakdown for endrin exceeded 20%: estimate positive results for endrin (J^{18}), and endrin ketone (JN^{18}) in all associated samples. If no endrin is present, but endrin ketone and/or endrin aldehyde are present: reject the CRQL (R^7) for endrin. Refer to Section on "Pesticide Instrument Performance" for details.

DATA VALIDATION RECOMMENDATION FOOTNOTES

J^{19} Initial calibration %RSD for this compound exceeded 10%: estimate positive results (J^{19}) for this compound in associated samples. Refer to Section on "Pesticide Instrument Performance" for details.

J^{20} Continuing calibration %D for this compound exceeded 15% (quantitation column) and/or 20% (confirmation column): estimate positive results (J^{20}) for this compound in associated samples. Refer to Section on "Pesticide Instrument Performance" for details.

J^{21} The %RSD for this unspiked compound in the sample/MS/MSD set exceeded the advisory criterion of < 30% for aqueous samples or < 50% for soil samples: estimate (J^{21}) positive results for that compound in the sample, MS, and MSD. Refer to Section on "Matrix Spike/Matrix Spike Duplicate" for details.

R^1 Holding times have been grossly exceeded: reject all non-detects (R^1).

R^2 The initial or continuing calibration RFs were low: estimate positive results (J^2) and reject non-detects (R^2). Refer to Section on "GC/MS Calibration" for details.

R^3 One or more of the surrogate standard %Recs was less than 10%: estimate positive results (J^9) and reject non-detects (R^3) within that area of the chromatogram. Refer to Section on "Surrogate Recoveries" for details.

R^4 The MS and/or MSD %Recs were less than 10% for this compound: estimate positive results in the unspiked sample (J^{11}) and reject non-detects (R^4). Refer to Section on "Matrix Spike/Matrix Spike Duplicate" for details.

R^5 One or more IS areas were grossly low: reject non-detects (R^5). Refer to Section on "Internal Standard Performance" for details.

R^6 % Breakdown for DDT was greater than 20%: estimate positive results for DDT (J^{17}), DDD, and DDE (JN^{17}) in all associated samples. If no DDT is present, but DDD and/or DDE are present: reject the CRQL (R^6) for DDT. Refer to Section on "Pesticide Instrument Performance" for details.

R^7 % Breakdown for endrin was greater than 20%: estimate positive results for endrin (J^{18}) and endrin ketone (JN^{18}) in all associated samples. If no endrin is present, but endrin ketone and/or endrin aldehyde are present: reject the CRQL (R^7) for endrin. Refer to Section on "Pesticide Instrument Performance" for details.

SAMPLE DATA SHEETS:

VOLATILE ORGANIC COMPOUNDS

META Environmental, Inc.
Sample Data Sheets: Volatile Organics Analysis

Reference: NVDV930503G
Site: Naval Submarine Base, Groton, CT
COC No.: N126, N127, N128

Sample ID:	13MW1S			13MW2S			13MW3S			13MW4S		
	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated
Chloromethane	10			10			10			10		
Bromomethane	10			10			10			10		
Vinyl Chloride	10			10			10			10		
Chloroethane	10			10			10			10		
Methylene Chloride	5			5			5			5		
Acetone	10			10	2J	10U5	10			10	23	J3, 23U6
Carbon Disulfide	5			5			5			5		
1,1-Dichloroethene	5			5			5			5		
1,1-Dichloroethane	5			5			5			5		
1,2- Dichloroethene(total)	5			5			5			5		
Chloroform	5			5			5			5		
1,2-Dichloroethane	5			5			5			5		
2-Butanone	10			10			10			10		
1,1,1-Trichloroethane	5			5			5			5		
Carbon Tetrachloride	5			5			5			5		
Vinyl Acetate	10			10			10			10		
Bromodichloromethane	5			5			5			5		
1,2-Dichloropropane	5			5			5			5		
cis-1,3-Dichloropropene	5			5			5			5		
Trichlorethene	5			5			5			5		
Dibromochloromethane	5			5			5			5		
1,1,2-Trichloroethane	5			5			5			5		
Benzene	5			5	5		5			5		
trans-1,3-Dichloropropene	5			5			5			5		
Bromoform	5			5			5			5		
4-Methyl-2-pentanone	10			10			10			10		
2-Hexanone	10			10			10			10		
Tetrachloroethane	5			5			5			5		
1,1,2,2-Tetrachloroethane	5			5			5			5		
Toluene	5			5			5			5		
Chlorobenzene	5			5			5			5		
Ethylbenzene	5			5	8		5			5		
Styrene	5			5			5			5		
Total Xylenes	5			5			5			5		
Dilution Factor:	1			1			1			1		
Matrix:	Water			Water			Water			Water		
Units:	µg/L			µg/L			µg/L			µg/L		

META

META Environmental, Inc.
Sample Data Sheets: Volatile Organics Analysis

Reference: NVDV930503G
Site: Naval Submarine Base, Groton, CT
COC No.: N126, N127, N128

Sample ID:	13MW5S			13MW9S								
	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated
Chloromethane	10			10			10			10		
Bromomethane	10			10			10			10		
Vinyl Chloride	10			10			10			10		
Chloroethane	10			10			10			10		
Methylene Chloride	5			5			5			5		
Acetone	10	6J	J3, 10U5	10			10			10		
Carbon Disulfide	5			5			5			5		
1,1-Dichloroethene	5			5			5			5		
1,1-Dichloroethane	5			5			5			5		
1,2- Dichloroethene(total)	5			5			5			5		
Chloroform	5			5			5			5		
1,2-Dichloroethane	5			5			5			5		
2-Butanone	10			10			10			10		
1,1,1-Trichloroethane	5			5			5			5		
Carbon Tetrachloride	5			5			5			5		
Vinyl Acetate	10			10			10			10		
Bromodichloromethane	5			5			5			5		
1,2-Dichloropropane	5			5			5			5		
cis-1,3-Dichloropropene	5			5			5			5		
Trichlorethene	5			5			5			5		
Dibromochloromethane	5			5			5			5		
1,1,2-Trichloroethane	5			5			5			5		
Benzene	5			5			5			5		
trans-1,3-Dichloropropene	5			5			5			5		
Bromoform	5			5			5			5		
4-Methyl-2-pentanone	10			10			10			10		
2-Hexanone	10			10			10			10		
Tetrachloroethane	5			5			5			5		
1,1,2,2-Tetrachloroethane	5			5			5			5		
Toluene	5			5			5			5		
Chlorobenzene	5			5			5			5		
Ethylbenzene	5			5			5			5		
Styrene	5			5			5			5		
Total Xylenes	5			5			5			5		
Dilution Factor:		1			1							
Matrix:		Water			Water							
Units:		µg/L			µg/L							

META

DATA VALIDATION RECOMMENDATION FOOTNOTES - INORGANICS

DATA VALIDATION RECOMMENDATION FOOTNOTES - INORGANICS

_____	A blank space denotes no change to the laboratory reported results.
J[1], UJ[1]	Holding times have been exceeded or samples were improperly preserved prior to analysis: estimate positive results (J[1]) and non-detects (UJ[1]). Refer to Section on "Holding Times" for details.
J[2], UJ[2]	Linearity was poor near the CRDL (low levels). Estimate the results. Refer to Section on "Calibration Verification Results" for details.
U[3]	The compound was present in the associated blank. The sample result was less than the action level of 5x the maximum concentration found in any blank, and has been rejected. Alternatively, the associated blank had a value below the negative IDL. The detection limit and/or positive results may be biased low. Refer to Section on "Laboratory Blank Results" for details.
J[4], UJ[4]	The ICS recovery for an element is outside of criteria or interelement interferences were indicated. The reported results or detection limit is estimated. See the Section on "ICP Inference Check Sample Results" for details.
J[5], UJ[5]	The recovery of an element is outside of criteria. The reported results or detection limit is estimated. See the Section on "Matrix Spike Results" for details.
J[6]	The RPD for laboratory duplicate sample analysis results exceeded 20% (35% for soils) for this analyte. The reported results are estimated See the Section on "Laboratory Duplicate Results" for details.
J[7]	The RPD for the field duplicate sample analysis results exceeded 30% (50% for soils) for this analyte. The reported results are estimated. See the Section on "Field Duplicate Results" for details.
J[8], UJ[8]	The LCS recovery for an element is outside of criteria. The reported results or detection limit is estimated. See the Section on "Laboratory Control Sample Results" for details.
J[9]	The %RSD of duplicate injections for GFAA analysis do not agree within ± 20%. The sample results are estimatedd. See the Section on "Furnace AA Results" for details.

J^{10}, UJ^{10}	The recovery of analytical spikes for GFAA analysis is outside of control limits. Positive sample results or detection limits are estimated. See the Section on "Furnace AA Results" for details.
J^{11}	The sample required MSA which either was not performed, was performed incorrectly, or the correlation coefficient was < 0.995. The positive results are estimated. See the Section on "Furnace AA Results" for details.
J^{12}, UJ^{12}	The results of the ICP Serial Dilution experiment was outside of criteria. Positive sample results or detection limits are estimated. See the Section on "ICP Serial Dilution Results" for details.
J^{13}	Element should have been run by GFAA. The reported value is an estimate.
J^{14}	The sample was less than 50% solids. Analysis using a method intended for soils might not give representative results. The results are estimated.
J^{15}, UJ^{15}	A CRDL standard was not run for mercury. As a result, uncertainty exists about the detection limit: estimate positive and non-detected results in the associated samples.
R^1	Holding times have been grossly exceeded. Reject all non-detects.
R^2	Instrument calibration was either not performed or not performed properly. Reject all associated data.
R^3	The ICS recovery for an element was less than 50% or severe interelement interferences were detected. Reject all associated data.
R^4	The matrix spike recovery for an element was less than 30%. Reject all associated data.
R^5	The recovery of an element in the aqueous LCS was less than 50%. Reject all associated data.
R^6	The analytical spike recovery for GFAA analysis was less than 10%. Reject the sample result.
R^7	The MSA did not meet criteria. Reject the sample result.
R^8	The ICP Serial Dilution did not meet criteria. Reject all associated data.

SAMPLE DATA SHEETS:

INORGANIC ANALYTES

META Environmental, Inc.
Sample Data Sheets: Inorganic Analysis

Reference: NVDV930503G
Site: Naval Submarine Base, Groton, CT
COC Nos.: N126, N127, N128

Sample ID:	IDL	13MW1S			13MW2S			13MW3S			13MW4S		
		Reported		Validated	Reported		Validated	Reported		Validated	Reported		Validated
Aluminum	30							31	B	U3	10600		
Antimony	25												
Arsenic	3		W		5	B		3.7	B		8.5	B	
Barium	15	24.1	B		45.7	B		24.3	B				
Beryllium	1												
Cadmium	2												
Calcium	30	17900			30600			27800			4820	B	
Chromium	5										5.9	B	U3
Cobalt	5							8.2	B				
Copper	5										15.6	B	
Iron	20	5650			11600			58600			984		
Lead	2		N		2.2	BN	U3		NW		9.4	SN	U3
Magnesium	40	2930	B		3150	B		4770	B		129	B	
Manganese	2	1090		J12	697			472			10.2	B	
Mercury	0.2			UJ15			UJ15			UJ15			UJ15
Nickel	7	27.2	B	J2, U3	19.7	B	J2, U3	23.2	B	J2, U3	23.5	B	J2, U3
Potassium	542	3070	B	U3	4700	B		4810	B		2090	B	U3
Selenium	1											W	
Silver	7												
Sodium	250	18200			14800			39200			354000		
Thallium	2												
Vanadium	20										22.6	B	
Zinc	2	28		J2, U3	13.4	B	J2, U3	18.3	B	J2, U3	26.5		J2, U3
Cyanide	5		N	UJ5		N	UJ5		N	UJ5		N	UJ5
Boron	200	1800			700			4100			58		
Dilution Factor:		1			1			1			1		
Matrix:		Water			Water			Water			Water		
Units:		µg/L			µg/L			µg/L			µg/L		

META

META Environmental, Inc.
Sample Data Sheets: Inorganic Analysis

Reference: NVDV930503G
Site: Naval Submarine Base, Groton, CT
COC Nos.: N126, N127, N128

Sample ID:	IDL	13MW5S Reported		13MW5S Validated	13MW9S Reported		13MW9S Validated	Reported	Validated	Reported	Validated
Aluminum	30	178	B								
Antimony	25										
Arsenic	3										
Barium	15	210			47.2	B					
Beryllium	1										
Cadmium	2										
Calcium	30	53300			90100						
Chromium	5	5.1	B	U3							
Cobalt	5										
Copper	5										
Iron	20	3260			414	NE					
Lead	2		WN				UJ10				
Magnesium	40	17200			263000						
Manganese	2	344			102						
Mercury	0.2			UJ15			UJ15				
Nickel	7	22	B	J2, U3	15.2		J2, U3				
Potassium	542	12700			86200						
Selenium	1				22	ME	J9,10				
Silver	7										
Sodium	250	177000			2E+06						
Thallium	2					W	UJ10				
Vanadium	20										
Zinc	2	12.9	B	J2, U3	10.6	B	J2, U3				
Cyanide	5		N	UJ5		N	UJ5				
Boron	200	18000			1800						

Dilution Factor:	1	1
Matrix:	Water	Water
Units:	µg/L	µg/L

META