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**THIRD SAMPLING REPORT
JUNE 1991
TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS**

September 6, 1991

Prepared for
Tutu Environmental Investigation Committee

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GERAGHTY & MILLER, INC.

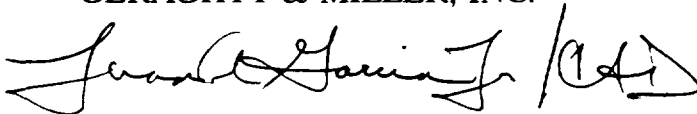
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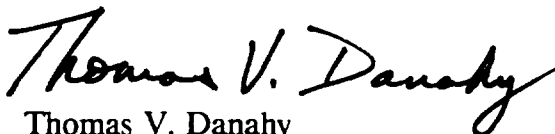
Geraghty & Miller, Inc. is submitting this report to the Tutu Environmental Investigation Committee for work performed at the Tutu Wells Site. The report was prepared in conformance with Geraghty & Miller's strict quality assurance/quality control procedures to ensure that the report meets the highest standards in terms of the method used and the information presented. If you have any questions or comments concerning this report, please contact one of the individuals listed below.

Respectfully submitted,

GERAGHTY & MILLER, INC.

A handwritten signature in black ink, appearing to read "Juan Garcia" followed by a stylized flourish.

Juan Garcia
Project Scientist

A handwritten signature in black ink, appearing to read "Thomas V. Danahy" in a cursive style.

Thomas V. Danahy
Senior Hydrogeologist/Project Manager

A large, stylized handwritten signature in black ink, appearing to read "Daniel A. Nachman".

Daniel A. Nachman
Vice President/Project Officer

TUT 002 2304

CONTENTS

	<u>Page</u>
INTRODUCTION	1
SAMPLING AND ANALYTICAL PROCEDURES	1
PROCEDURAL DEVIATIONS	5
RESULTS AND DISCUSSION	7
DATA QUALITY EXCEPTIONS	7
ORGANIC ANALYTICAL RESULTS	9
RECOMMENDATIONS	10
REFERENCES	12

TABLES

1. List of Wells and Analytical Parameters for the Third Sampling Event, June 1991, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.
2. Summary of Detected Parameters for the Third Quarterly Event, June 1991, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.
3. Concentrations of Volatile Organic Compounds in Ground-Water Samples Collected in June 1991 at the Tutu Wells Site, St. Thomas, U.S. Virgin Islands.
4. Summary of Blank Sample Contamination and Associated Samples for the Third Sampling Event, June 1991, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.
5. Holding Time Non-Compliance Summary for the Third Sampling Event, June 1991, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.
6. Summary of Detected Volatile Organic Compounds in Ground-Water Samples Collected in September 1990, February 1991 and June 1991 at the Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

TUT 002 2305

TABLES (Continued)

7. Comparative Results of Analysis for Volatile Organic Compounds in Ground-Water Samples Collected from September 1990 to June 1991, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.
8. Proposed Sampling Effort for the Fourth Sampling Event, October 1991, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

FIGURE

1. Well Sampling Locations, Tutu Wells Site Sampling, Analysis, and Monitoring Plan, St. Thomas, U.S. Virgin Islands.

APPENDIX

- A. Data Validation Summary Report for the Tutu Wells Site, June 1991 Sampling Event, St. Thomas, U.S. Virgin Islands.

TUT 002 2306

**THIRD SAMPLING REPORT
JUNE 1991
TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS**

INTRODUCTION

Geraghty & Miller, Inc. has prepared the Tutu Wells Site Third Sampling Report (June 1991) for both L'Henri, Inc. (O'Henry) and the Tutu Environmental Investigation Committee (TEIC), which is comprised of Texaco Caribbean Inc. (Texaco) and Esso U.S. Virgin Islands (Esso). This report was prepared in accordance with the Administrative Order (AO), effective March 22, 1990, and with the requirements detailed in the "Sampling, Analysis, and Monitoring Plan (SAMP) for Wells, Tutu Wells Site, St. Thomas, U.S. Virgin Islands," September 1990 (Geraghty & Miller, Inc. 1990), which was approved by the U.S. Environmental Protection Agency (USEPA) in its September 21, 1990 letter to TEIC. After submission of the First Sampling Report (Geraghty & Miller, Inc. 1991a), modifications to the analytical procedures were agreed upon by representatives of the USEPA, Geraghty & Miller, and Ceimic Corporation (the laboratory analyzing the samples) during telephone calls on January 22, January 24, and February 1, 1991 documented in the Second Sampling Report (Geraghty & Miller, Inc. 1991b).

The objectives of the SAMP (Geraghty & Miller, Inc. 1990) are to identify, quantify, and monitor the occurrence of gasoline constituents and tetrachloroethene (commonly referred to as perchloroethylene and abbreviated as PCE) and its breakdown products in particular wells in the vicinity of Route 38 within the Tutu Wells site (see Figure 1).

SAMPLING AND ANALYTICAL PROCEDURES

The third quarter sampling was conducted from June 4 through 6, 1991 by Soil Tech Corporation and Geraghty & Miller. Table 1 lists the wells and analytical parameters for the June 1991 sampling. Ms. Ana Gloria Ramos, Designated Coordinator for TEIC, was present throughout the sampling event. Ms. Julie May Monsanto of the U.S. Virgin Islands

Department of Planning and Natural Resources (DPNR) and Ms. Caroline Kwan of USEPA-Region II were also present throughout the sampling event.

Sampling and analysis were performed as described in the SAMP, with the exception of the few deviations outlined in the following section. In brief, the wells were sampled and analyzed for the Target Compound List (TCL) volatile organic compounds (VOCs), in accordance with a modified version of USEPA Method 524.2 in order to achieve lower detection levels. Ceimic Corporation of Narragansett, Rhode Island, provided analytical services.

In 13 of the 14 wells sampled for the June 1991 sampling event, the samples were collected utilizing the permanent pumps and piping systems. These wells were evacuated prior to sampling by pumping the wells for a minimum of 15 minutes. One well (Gassett), which is not outfitted with a permanent pump, was evacuated using a submersible pump powered by a portable generator. After purging 4.6 well volumes, the submersible pump was removed and the sample collected from the Gassett well was obtained using a Teflon bailer.

The VOC parameters detected in the June 1991 samples are summarized in Table 2. The complete VOC validated data for the June 1991 sampling event are presented in Table 3. Sample names which require explanation are as follows:

- o The spelling of sample Ramsay was corrected from the improper spelling (of Ramsey) used during the first two sampling events. Ramsay is the correct spelling.
- o A blind field replicate sample labeled "X-1" was collected at the LaPlace well. On the validated tables, sample X-1 was renamed LaPlace FR.

- o A sample of distilled and deionized water supplied by Soil Tech Corporation was collected in the field and labeled "Deionize Water" on the chain-of-custody form. The laboratory used the name "DI Water" for this sample.
- o Prior to sampling the Gassett well, a Teflon bailer was decontaminated using the following procedures:
 1. Detergent wash using Liquinox and water from the Gassett storage tank (i.e., Gassett well water).
 2. Water rinse using water from Gassett storage tank.
 3. Methanol rinse.
 4. Hexane rinse.
 5. Bailer allowed to air dry.

Then, an equipment blank sample was collected by rinsing the distilled and deionized water through the clean Teflon bailer. The equipment blank was labeled "Equip. Blank" on the chain-of-custody. The laboratory used the name "Equipment Bla" for this sample. After the equipment blank was prepared in the field, the Teflon bailer was used to collect the sample from the Gassett well.

The distilled and deionized water used in preparation of the "Deionize Water" sample and the "Equip. Blank" sample was purchased by Soil Tech in Puerto Rico. A preliminary sample of the distilled water was sent by Soil Tech to Ceimic. Reportedly, the distilled/deionized water contained trihalomethanes, presumably due to water supply treatment. Ceimic reported this result verbally; no written documentation was provided. Although trihalomethanes were suspected in the distilled water, Soil Tech brought distilled water from the same source for preparation of an equipment blank prior to sampling Gassett. A field decision by USEPA and Geraghty & Miller representatives allowed the distilled water to be used since trihalomethanes are not parameters of concern at the Tutu

wells site (Kwan, pers. comm., 1991). The sample labeled "Deionize Water" was collected to verify the presence of trihalomethanes.

Trip blank samples were prepared by Ceimic Corporation and shipped to Soil Tech Corporation with the other sample vials. The objective of a trip blank is to measure potential cross-contamination of samples during vial preparation, shipment, and analysis. A trip blank sample was included in each cooler containing samples that was shipped daily from the Tutu site to Ceimic via overnight delivery service. A total of three coolers, each with a trip blank and other samples, were shipped.

The concentrations of VOCs in the trip blank samples are presented in Table 3 and a summary of blank samples are presented in Table 4. The laboratory added the date of shipment sample name (e.g., Trip Blank 6-4) to distinguish each trip blank. It should be noted that the trip blank shipped with the samples collected on June 6, 1991 was labeled "Trip Blank 6-7" by the laboratory. The detection of chloromethane and 1,2-dichloroethane in all three trip blanks at low levels indicates cross-contamination of these parameters. The detection of acetone, methylene chloride, and toluene at low levels in two of the three trip blanks indicates cross-contamination of these parameters. It is likely that all of these parameters detected in the trip blanks are the result of laboratory contamination. A complete discussion of the data validation qualifiers applied to these data is presented in Appendix A.

Geraghty & Miller validated the analytical data in accordance with the USEPA Standard Operating Procedures (SOP) No. HW-6, March 1990, for organic compounds. The data validation summary is provided in Appendix A. The analytical results for the June 1991 sampling are summarized in Tables 2 and 3. Details of the sampling and analysis procedures, data validation requirements, and reporting requirements are provided in the SAMP (Geraghty & Miller, Inc. 1990).

TUT 002 2310

PROCEDURAL DEVIATIONS

Deviations from the scope of work and procedures as presented in the SAMP are outlined below.

1. Four Winds I was not sampled during the September 1990, February 1991, and June 1991 sampling events due to an inoperable pump. VIHA I was not sampled during the February 1991 and June 1991 sampling events due to an inoperable pump. The well owners are not willing to repair the pumps until the wells can be used as a source of water.
2. As noted in the First Quarterly Sampling Report (Geraghty & Miller, Inc. 1991), the integrity of the well sampled on the Gassett property (formerly Hartman I) during the September 1990 sampling event was poor. An oily rag was previously reported to have been present in this well, which is located on the north side of the Gassett property. During the second and third quarterly sampling events (February and June 1991), a newer well on the southwestern portion of the Gassett property was sampled. Due to the poor integrity, sampling quality limitations, and change in sampling locations, the September 1990 results for the Gassett well are not suitable for comparison with the February and June 1991 results.
3. During the June 1991 sampling, the Tillett well was pumped for a minimum of 15 minutes prior to sampling, as specified in the SAMP. However, due to logistical problems associated with containerizing the evacuated water, the water was pumped at a low rate and only approximately 220 gallons were removed prior to sampling. Data provided by the U.S. Geological Survey (USGS) indicate that the Tillett well is 100 feet deep and 6 inches in diameter. Assuming a depth to water of 20 feet, three well volumes can be calculated as being equal to approximately 360 gallons.

4. In accordance with the recommendations presented by Geraghty & Miller (1991b) in the Second Quarter Sampling Report and subsequently approved by the USEPA, the list of wells for the third quarter (June 1991) sampling was reduced by nine wells. These nine wells were removed from the sampling list based upon the results of the September 1990 and February 1991 sampling results, geographic location, and hydrogeologic relationship with the area of elevated VOCs in Tutu. Table 1 lists the sampling locations and analytical parameters for the third sampling event.
5. In non-compliance with the quality control (QC) section of the SAMP, the laboratory added the surrogate spike compound 1,2-dichlorobenzene-d4 (DCB-d4), at a final concentration of 2 micrograms per liter (ug/L) (equivalent to parts per billion [ppb]) to each sample instead of the specified 1 ug/L.
6. The laboratory fortified blanks (LFBs) did not meet all of the method criteria (and/or suggested expanded criteria) as required. In accordance with Method 524.2, these specifications must be met, or deficiencies remedied, prior to sample analysis. The laboratory did not remedy the deficiencies. The parameters of concern affected were toluene, trichloroethene, vinyl chloride, and 1,1-dichloroethene in three samples (Gassett, Hartman I, and Hartman II) and vinyl chloride in two samples (LaPlace and Matthias). These values were qualified as estimated (indicated by "J").
7. The laboratory exceeded holding times prior to the analysis of ten samples and eleven dilutions (see Table 5). Depending on the individual sample or dilution, qualifiers were added to the affected data. Two of the eleven sample dilutions that were analyzed beyond the holding times (Smith DUP and X-1 DUP) did not require qualification because only the aromatics fraction was beyond holding time and no aromatics were detected in the original undiluted

analysis. Holding time violations and associated data validation qualifiers are discussed further in Appendix A.

RESULTS AND DISCUSSION

A summary of the volatile organic analytical results for the third quarter (June 1991) sampling event is provided in Table 2. The complete validated VOC data results are presented in Table 3. Table 6 presents a summary of detected VOC parameters for the first three quarterly sampling events. The complete validated VOC data results for the three quarterly events (September 1990, February 1991, and June 1991) are presented in Table 7.

DATA QUALITY EXCEPTIONS

A discussion of the data validation findings is provided in Appendix A. Overall, Ceimic Corporation has provided valid data of acceptable completeness. Several QC deficiencies have resulted in data that are for the most part usable, although they are extensively qualified. Sample data have not been rejected when estimated as a result of more than one deficiency.

Holding time violations for the Elgin III, Four Winds II, Hartman II, Harvey, LaPlace, Matthias, Smith, Steele, Tillett, and X-1 samples required the data to be qualified as estimated (indicated by "J") for the aromatic compounds (e.g., benzene, toluene, ethylbenzene, xylene). Sample dilutions (labeled with the suffix "DUP" by the laboratory) for Elgin I, Elgin III, Four Winds II, Harvey, LaPlace, Steele, and Tillett had holding time violations (see Table 5).

All of the sample data for 2-butanone and most of the data for acetone are rejected due to poor instrument sensitivity (low response factors). Some sample data for vinyl acetate are rejected due to poor recovery from the associated LFB. Much of the sample

data are qualified as estimated because the laboratory failed to analyze the samples within the required holding times for aromatic organic compounds and the sample dilutions within the required holding times for either aromatic compounds or 1,2-dichloroethene (1,2-DCE), trichloroethene (TCE), and tetrachloroethene (PCE).

Some sample data for methylene chloride are negated since their presence is the result of laboratory contamination. The equipment blank results for trihalomethanes are negated since their presence is the result of water source contamination. Some sample data for acetone, methylene chloride, 1,2-dichloroethane, toluene, and the tentatively identified compound (TIC), 1,1,2-trichloro-1,2,2-trifluoromethane, are negated since their presence is the result of trip blank contamination.

Some sample data for methylene chloride are qualified as estimated due to a large percent difference in the response factor for methylene chloride from the associated continuing calibration. All of the data for a number of the samples are qualified as estimated as a result of poor surrogate recoveries. The data for 1,2-DCE, TCE, and PCE from the dilution of sample Tillett are qualified as estimated because the associated internal standard area counts are low.

Much of the sample data for chloromethane, bromomethane, vinyl chloride, chloroethane, carbon disulfide, 1,1-DCE, TCE, carbon tetrachloride, bromoform, and toluene are qualified as estimated due to poor recoveries from the LFB analyses.

The March 1991 Method Detection Limit (MDL) study resulted in numerous compounds not meeting the preliminary accuracy requirements needed to establish the baseline MDL for the low-level analysis. In reviewing the MDL accuracy measurements for the compounds exceeding the criteria, the recoveries for 1,1-DCE, trans-1,2-DCE, 1,1,1-trichloroethane, carbon tetrachloride, and benzene were within ± 10 percent of the 80 to 120 percent recovery criteria. The precision requirement between replicate measurements in the MDL study ($RSD < 20$ percent) was met for most compounds. The MDL study of

March 1991 adequately establishes the laboratory's capability to analyze samples with the accuracy and precision needed for low-level analyses.

ORGANIC ANALYTICAL RESULTS

VOCs constitute the chief analyte group of concern at the Tutu Wells site. The compounds that were consistently detected in site samples are PCE, TCE, and 1,2-DCE. All three compounds were detected in samples from the following wells: Eglin I, Eglin II, Eglin III, Four Winds II, Harvey, Hartman II, LaPlace, Matthias, Smith, Steele, and Tillett. PCE and 1,2-DCE were detected in the sample from the Ramsay well (see Table 6).

Other VOCs detected in samples from the site included vinyl chloride, chloroform, 1,1,2-trichloroethane (1,1,2-TCA), benzene, and toluene (see Table 6). Vinyl chloride was detected in the Harvey (3 ppb), Steele (4 ppb), and Tillett (5 ppb) samples. Trace levels of chloroform were reported in the LaPlace (2 ppb and 0.85 ppb in the field replicate of LaPlace), Ramsay (1 ppb), and Tillett (0.9 ppb) samples. Low levels of 1,1,2-TCA were detected in the LaPlace (5 ppb), Matthias (4 ppb), and Tillett (4 ppb) samples. The Eglin I sample had a reported estimated value (1J ppb) of 1,1,2-TCA. Benzene and toluene were detected in only the Tillett sample at estimated concentrations of 3J ppb and 0.8J ppb, respectively.

Both the Gassett and Hartman III samples had non-detectable results for all of the target compound list VOCs (see Table 7).

The June 1991 sampling results are consistent with the results of the two previous sampling events at the Tutu wells site (see Table 7). The distribution of elevated VOC concentrations in ground water appears to be limited to the central Tutu area, occurring in an elongated north-south direction from the Ramsay and VIHA-I wells (at the north) to the Matthias well (at the south). The Harvey and Tillett samples have consistently contained the highest reported VOC concentrations. TCE, PCE, and 1,2-DCE are the VOCs detected

at the highest concentrations. Trace concentrations of other chlorinated hydrocarbons (e.g., vinyl chloride) were also detected, but at fewer locations.

Petroleum compounds, such as benzene, toluene, ethylbenzene, and xylenes (BTEX) have not been detected in the majority of the wells sampled in the three sampling events. BTEX compounds have only been detected in the Tillett sample (all three sampling rounds) and the Gassett sample (February 1991 sampling round only).

RECOMMENDATIONS

The June 1991 sampling results meet the prescribed objectives of the SAMP (Geraghty & Miller, Inc. 1990), although the data were extensively qualified. Geraghty & Miller recommends that the SAMP continue to be followed, but the revisions discussed below should be implemented.

The cumulative QC problems caused by the laboratory (i.e., non-compliance with holding times, only fair MDL results, LFB recoveries outside of QC limits), which caused extensive qualification of the data, warrants the replacement of Ceimic Corporation. Geraghty & Miller has recommended Enseco-East of Somerset, New Jersey as the laboratory subcontractor. A preliminary meeting was held on July 15, 1991 with the USEPA to discuss the proposed replacement of Ceimic and to clarify the sampling and analytical procedures. The meeting was attended by representatives from USEPA, TEIC, Geraghty & Miller, and Enseco-East. It was agreed that the SAMP would be revised and resubmitted to the USEPA to (1) incorporate the clarifications of the sampling and analytical procedures and (2) reflect the change in the analytical laboratory subcontractor. The revised SAMP will be effective beginning with the fourth sampling event (October 1, 1991). The revised SAMP will be submitted to the USEPA at least two weeks prior to the fourth sampling event.

Due to the non-detectable results for two samples (i.e., Gassett and Hartman III) Geraghty & Miller recommends that, depending upon the results of the next sampling event,

these sampling locations be considered for removal from the sampling list. If the Gassett and Hartman III samples have no detectable VOCs in the fourth sampling event (October 1, 1991), these wells should be removed from the sampling list.

VIHA-I has not been sampled during the past two quarterly events due to an inoperable pump. Geraghty & Miller recommends that VIHA-II be sampled as an alternate location, if it is accessible.

Geraghty & Miller also recommends that the fourth sampling event (scheduled to begin October 1, 1991) include only the locations and parameters outlined in Table 8. The fifth sampling event is tentatively scheduled for either the week beginning February 3, 1992 or the week beginning February 10, 1992.

REFERENCES

- Geraghty & Miller, Inc. 1990, Sampling, Analysis, and Monitoring Plan for Wells, Tutu Wells Site, St. Thomas, U.S. Virgin Islands. Prepared for Tutu Environmental Investigation Committee, September 1990.
- Geraghty & Miller, Inc. 1991a, First Sampling Report, September 1990, Tutu Wells Site Quarterly Sampling, St. Thomas, U.S. Virgin Islands. Prepared for Tutu Environmental Investigation Committee, January 1991.
- Geraghty & Miller, Inc. 1991b, Second Sampling Report, February 1991, Tutu Wells Site Quarterly Sampling, St. Thomas, U.S. Virgin Islands. Prepared for the Tutu Environmental Investigation Committee, May 13, 1991.
- Kwan, C. 1991, U.S. Environmental Protection Agency Personal Communication with Thomas V. Danahy, Geraghty & Miller, Inc., Re: Approved for Use of Soil Tech Distilled and Deionized Water for Equipment Blank Preparation, June 4, 1991.

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TABLES

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Table 1. List of Wells and Analytical Parameters for the Third Sampling Event, June 1991, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Well	Proposed Analytes
Eglin I	VOCs
Eglin II	VOCs
Eglin III	VOCs
Four Winds I	VOCs
Gassett	VOCs
Hartman II	VOCs
Hartman III	VOCs
Harvey	VOCs
LaPlace	VOCs
Matthias	VOCs
Ramsay	VOCs
Smith	VOCs
Steele	VOCs
Tillett	VOCs

VOCs Volatile organic compounds.

Analysis will be performed using modified USEPA Method 524.2.

Four Winds II and VIHA I were not sampled due to inoperable pumps.

Table 2. Summary of Detected Concentrations of Volatile Organic Compounds in Ground-Water Samples Collected in June 1991 at Tutu, St. Thomas, Virgin Islands, USA.

Sample ID:	Eglin I	Eglin II	Eglin III	Four Winds II	Hartman II	Harvey	LaPlace
Date:	5-JUNE-91	5-JUNE-91	5-JUNE-91	5-JUNE-91	4-JUNE-91	4-JUNE-91	6-JUNE-91
Analyte							
1,2-Dichloroethene (total)	68 DJ	130 DJ	69 D	130 DJ	6 J	80 DJ	250 DEJ
Chloroform	R	ND	ND	ND	ND	ND	2
Trichloroethene	10 J	19 J	15 J	12 J	1 J	36 DJ	31 D
1,1,2-Trichloroethane	1 J	ND	ND	ND	ND	ND	5
Tetrachloroethene	32 J	61 DJ	40 J	34 DJ	7 J	530 DEJ	88 DJ

Analyte concentrations in micrograms per liter [parts per billion (ppb)].

Analyses were performed by Ceimic Corporation, Narragansett, Rhode Island, using USEPA Method 524.2.

D Compound was quantified using a secondary dilution by USEDA method 624.

E Result is outside the calibration range.

J Result was detected below the reporting limit or is an estimated concentration.

R Result is unusable and rejected. (Note: Compound may or may not be present.)

ND Compound not detected.

TUT 002 2321

Table 2. Summary of Detected Concentrations of Volatile Organic Compounds in Ground-Water Samples Collected in June 1991 at Tutu, St. Thomas, Virgin Islands, USA.

Sample ID:	LaPlace FR	Matthias	Ramsay	Smith	Steele	Tillett
Date:	6-JUNE-91	6-JUNE-91	5-JUNE-91	6-JUNE-91	5-JUNE-91	5-JUNE-91
Analyte						
Vinyl Chloride	ND	ND	R	ND	4	5
Acetone	R	ND	15 J	R	R	R
1,2-Dichloroethene (total)	170 DJ	36 J	2 J	62 D	180 DJ	400 DEJ
Chloroform	0.8 J	ND	1	ND	ND	0.9
Trichloroethene	32 J	12	R	26	42 DJ	72 DJ
1,1,2-Trichloroeth-9	ND	4	R	ND	ND	4
Tetrachloroethene	64 DJ	59 D	16	190 D	150 DJ	180 DJ
Benzene	ND	ND	R	ND	ND	3 J
Toluene	ND	ND	R	ND	ND	0.8 J

Analyte concentrations in micrograms per liter [parts per billion (ppb)].

Analyses were performed by Ceimic Corporation, Narragansett, Rhode Island, using USEPA Method 524.2.

D Compound was quantified using a secondary dilution.

E Result is outside the calibration range.

J Result was detected below the reporting limit or is an estimated concentration.

R Result is unusable and rejected. (Note: Compound may or may not be present.)

ND Compound not detected

TUT 002 2322

Table 3. Concentrations of Volatile Organic Compounds in Ground-Water Samples Collected in June 1991 at the Tutu Wells Site, St. Thomas, U.S Virgin Islands.

Analyte	Sample ID	Eglin I	Eglin II	Eglin III	Four Winds II	Gassett	Hartman II	Hartman III	Harvey	LaPlace	LaPlace FR	Matthias	Ramsay	Smith
	Date	5-Jun-91	5-Jun-91	5-Jun-91	5-Jun-91	4-Jun-91	4-Jun-91	4-Jun-91	4-Jun-91	6-Jun-91	6-Jun-91	6-Jun-91	5-Jun-91	6-Jun-91
Chloromethane		R	R	1 UJ	1 UJ	2 UJ	1 UJ	1 U	1 U	1 UJ	1 UJ	1 UJ	2 UJ	1 UJ
Bromomethane		R	R	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	1 UJ	1 UJ	1 UJ	R	1 UJ
Vinyl chloride		R	R	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	3	1 UJ	1 UJ	1 UJ	R	1 UJ
Chloroethane		R	R	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	1 UJ	1 UJ	1 UJ	R	1 UJ
Methylene chloride		R	R	0.5 UJ	0.5 UJ	2 UJ	0.5 UJ	2 U	7 U	3 UJ	1 UJ	2 UJ	R	1 UJ
Acetone		R	R	2 UJ	R	10 UJ	R	8 UJ	R	R	R	2 UJ	15 J	R
Carbon disulfide		R	R	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	R	0.5 UJ
1,1-Dichloroethene		R	R	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 UJ	0.5 U	R	0.5 UJ
1,1-Dichloroethane		R	R	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	R	0.5 UJ
1,2-Dichloroethene (total)		68 DJ	130 DJ	69 DJ	130 DJ	0.5 UJ	6 J	0.5 U	80 DJ	250 DEJ	170 DJ	36 J	2 J	62 D
Chloroform		R	R	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U	2	0.8 J	0.5 U	1 J	0.5 UJ
1,2-Dichloroethane		R	R	0.5 UJ	0.5 UJ	1 UJ	0.5 UJ	1 U	0.5 U	0.5 U	0.5 UJ	0.5 U	1 UJ	0.5 UJ
2-Butanone		R	R	R	R	R	R	R	R	R	R	R	R	R
1,1,1-Trichloroethane		R	R	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 UJ	0.5 U	R	0.5 UJ
Carbon tetrachloride		R	R	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	R	0.5 UJ
Vinyl acetate		R	R	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	R	1 UJ	R	R	1 UJ
Bromodichloromethane		R	R	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	R	0.5 UJ
1,2-Dichloropropane		R	R	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	R	0.5 UJ
cis-1,3-Dichloropropene		R	R	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	R	0.5 UJ
Trichloroethene		10 J	19 J	15 J	12 J	0.5 UJ	1 J	0.5 UJ	36 DJ	31 D	32 J	12	R	26
Dibromochloromethane		R	R	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	R	0.5 UJ
1,1,2-Trichloroethane		1 J	R	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U	5	0.5 UJ	4	R	0.5 UJ
Benzene		R	R	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	R	0.5 UJ
trans-1,3-Dichloropropene		R	R	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	R	0.5 UJ
Bromoform		R	R	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	R	0.5 UJ
4-Methyl-2-pentanone		R	R	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	1 U	1 UJ	1 U	R	1 UJ
2-Hexanone		R	R	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	1 U	1 UJ	1 U	R	1 UJ
Tetrachloroethene		32 J	61 DJ	40 J	34 DJ	0.5 UJ	7 J	0.5 U	530 DEJ	88 DJ	64 DJ	59 DJ	16	190 D
1,1,2,2-Tetrachloroethane		R	R	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	R	0.5 UJ
Toluene		R	R	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	4 UJ	3 UJ	0.5 UJ	R	0.5 UJ
Chlorobenzene		R	R	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	R	0.5 UJ
Ethylbenzene		R	R	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	R	0.5 UJ
Styrene		R	R	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	R	0.5 UJ
Xylenes (total)		R	R	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	R	0.5 UJ

Analyte concentrations in micrograms per liter. [parts per billion (ppb)].

Analyses were performed by Ceimic Corporation, Narragansett, Rhode Island, using USEPA Method 524.2.

- D Compound was quantified using a secondary dilution by USEPA Method 624.
 E Result is outside the calibration range.
 J Result was detected below the reporting limit or is an estimated concentration.
 R Result is unusable and rejected. (Note: Compound may or may not be present.)
 U Compound was analyzed for but was not detected.
 FR Sample ID suffix denotes Field Replicate of previous sample.

Table 3. Concentrations of Volatile Organic Compounds in Ground-Water Samples Collected in June 1991 at the Tutu Wells Site, St. Thomas, U.S Virgin Islands.

Analyte	Sample ID	Steele	Tillett	Deionized Water	Equipment Blank	Trip Blank	Trip Blank	Trip Blank
	Date	5-Jun-91	5-Jun-91	4-Jun-91	4-Jun-91	4-Jun-91	5-Jun-91	6-Jun-91
Chloromethane		1 UJ	1 U	0.9 J	1 UJ	9 J	2 J	6 J
Bromomethane		1 U	1 U	1 U	1 UJ	1 UJ	1 UJ	1 UJ
Vinyl chloride		4	5	1 U	1 UJ	1 UJ	1 UJ	1 UJ
Chloroethane		1 UJ	1 U	1 U	1 UJ	1 UJ	1 UJ	1 UJ
Methylene chloride		0.5 UJ	5 U	1	1 J	0.8 J	1 UJ	0.9 J
Acetone		R	R	8 J	7 J	11 J	R	8 J
Carbon disulfide		0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
1,1-Dichloroethene		0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U
1,1-Dichloroethane		0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U
1,2-Dichloroethene (total)		180 DJ	400 DEJ	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U
Chloroform		0.5 U	0.9	53 D	43 UJ	0.5 U	0.5 UJ	0.5 U
1,2-Dichloroethane		0.5 U	0.5 U	1	1 J	2	1 J	2
2-Butanone		R	R	R	R	R	R	R
1,1,1-Trichloroethane		0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U
Carbon tetrachloride		0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
Vinyl acetate		1 U	1 U	1 U	1 UJ	R	1 UJ	R
Bromodichloromethane		0.5 U	0.5 U	18	14 UJ	0.5 U	0.5 UJ	0.5 U
1,2-Dichloropropane		0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U
cis-1,3-Dichloropropene		0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U
Trichloroethene		42 DJ	72 DJ	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U
Dibromochloromethane		0.5 U	0.5 U	5	4 UJ	0.5 U	0.5 UJ	0.5 U
1,1,2-Trichloroethane		0.5 U	4	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U
Benzene		0.5 U	3 J	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U
trans-1,3-Dichloropropene		0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U
Bromoform		0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
4-Methyl-2-pentanone		1 U	1 U	1 U	1 UJ	1 U	1 UJ	1 U
2-Hexanone		1 U	1 U	1 U	1 UJ	1 U	1 UJ	0.8 J
Tetrachloroethene		150 DJ	180 DJ	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U
1,1,2,2-Tetrachloroethane		0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U
Toluene		0.5 UJ	0.8 J	0.5 U	0.5 UJ	2	0.5 UJ	2
Chlorobenzene		0.5 UJ	0.5 UJ	0.5 U	0.5 UJ	0.5 U	5 UJ	0.5 U
Ethylbenzene		0.5 UJ	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U
Styrene		0.5 UJ	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U
Xylenes (total)		0.5 UJ	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U

Analyte concentrations in micrograms per liter. [parts per billion (ppb)].

Analyses were performed by Ceimic Corporation, Narragansett, Rhode Island, using USEPA Method 524.2.

- D Compound was quantified using a secondary dilution by USEPA Method 624.
 E Result is outside the calibration range.
 J Result was detected below the reporting limit or is an estimated concentration.
 R Result is unusable and rejected. (Note: Compound may or may not be present.)
 U Compound was analyzed for but was not detected.
 FR Sample ID suffix denotes Field Replicate of previous sample.

Table 4. Summary of Blank Contamination and Associated Samples for the Third Sampling Event, June 1991, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Type of Blank	Associated Sample(s)
<u>Method Blank</u>	
VBLK01	Eglin I, Eglin II, Eglin III, Four Winds II, Ramsay, Steele, Trip Blank6-5
VBLK02	Gassett, Hartman II, Hartman III
VBLK03	Harvey, Tillett
VBLK06	DI Water Dup, Eglin III Dup, Eglin I Dup, Four Winds II Dup, Harvey Dup, Laplace Dup, Smith Dup, Steele Dup, Tillett Dup, X-1 Dup
VBLK07	Eglin II Dup
VBLK08	Matthias Dup
<u>Field Blank</u>	
DI Water	Equipment Bla, Gassett, Hartman II, Hartman III, Harvey
<u>Trip Blank</u>	
Trip Blank 6-4	Equipment Bla, Gassett, Hartman II, Hartman III, Harvey
Trip Blank 6-5	Eglin I, Eglin II, Eglin III, Four Winds II, Ramsay, Steele, Tillett
Trip Blank 6-7	LaPlace, Matthias, Smith, X-1
<u>Equipment Blank</u>	
Equipment Bla	Gassett

Table 5. Holding Time Non-Compliance Summary for the Third Sampling Event, June 1991, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Sample ID (Form I)	Date and Time Sampled	Date and Time Analyzed	Days Holding Time Exceeded for:	
			Aromatic VOCs	All Other VOCs
DI Water	6/4/91 11:15	6/13/91 17:49	0	0
DI Water DUP		6/20/91 03:51	1.7	1.7
Eglin I	6/5/91 10:43	6/12/91 16:01	0	0
Eglin I DUP		6/19/91 23:51	0.55	0.55
Eglin II	6/5/91 09:40	6/12/91 15:16	0	0
Eglin II DUP		6/13/91 06:00	0	0
Eglin III *	6/5/91 10:10	6/12/91 16:40	0.27	0
Eglin III DUP *		6/20/91 00:31	7.6	.60
Equipment Bla	6/4/91 11:27	6/13/91 18:27	0	0

* Sample was not preserved

DUP suffix indicates sample dilution

VOCs Volatile Organic Compounds

Table 5. Holding Time Non-Compliance Summary for the Third Sampling Event, June 1991, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Sample ID (Form I)	Date and Time Sampled	Date and Time Analyzed	Days Holding Time Exceeded for:	
			Aromatic VOCs	All Other VOCs
Four Winds II *	6/5/91 11:30	6/12/91 20:09	0.36	0
Four Winds II DUP *		6/20/91 01:11	8.1	1.1
Gassett	6/4/91 11:55	6/14/91 13:43	0	0
Hartman II *	6/4/91 12:45	6/14/91 15:56	3.6	0
Hartman III	6/4/91 10:15	6/14/91 14:22	0	0
Harvey *	6/4/91 13:30	6/17/91 17:42	6.2	0
Harvey DUP *		6/20/91 01:51	8.5	1.5
LaPlace *	6/6/91 09:00	6/13/91 02:27	0.23	0
LaPlace DUP *		6/20/91 04:31	7.3	0.31

* Sample was not preserved
 DUP suffix indicates sample dilution
 VOCs Volatile Organic Compounds

Table 5. Holding Time Non-Compliance Summary for the Third Sampling Event, June 1991, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Sample ID (Form I)	Date and Time Sampled	Date and Time Analyzed	Days Holding Time Exceeded for:	
			Aromatic VOCs	All Other VOCs
Matthias *	6/6/91 10:50	6/13/91 03:06	0.18	0
Matthias DUP *		6/13/91 20:58	0.42	0
Ramsay	6/5/91 08:45	6/12/91 17:48	0	0
Ramsay MS	6/5/91 08:45	6/13/91 19:05	0	0
Ramsay MSD	6/5/91 08:45	6/13/91 19:43	0	0
Smith *	6/6/91 10:04	6/13/91 16:14	0.26	0
Smith DUP *		6/20/91 05:11	6.8	0
Steele *	6/5/91 07:52	6/12/91 18:27	0.44	0

* Sample was not preserved
 DUP suffix indicates sample dilution
 VOCs Volatile Organic Compounds
 MS Matrix Spike
 MSD Matrix Spike Duplicate

Table 5. Holding Time Non-Compliance Summary for the Third Sampling Event, June 1991, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Sample ID (Form I)	Date and Time Sampled	Date and Time Analyzed	Days Holding Time Exceeded for:	
			Aromatic VOCs	All Other VOCs
Steele DUP *		6/20/91 02:31	7.3	0.27
Tillett *	6/5/91 13:45	6/17/91 18:18	5.2	0
Tillett DUP *		6/20/91 03:11	7.6	0.56
Trip Blank 6-4	6/4/91	6/13/91 01:48	0	0
Trip Blank 6-5	6/5/91	6/12/91 19:06	0	0
Trip Blank 6-7	6/6/91	6/13/91 01:10	0	0
X-1 *	6/6/91 09:01	6/13/91 17:11	0.34	0
X-1 DUP *		6/20/91 05:52	6.9	0

* Sample was not preserved
 DUP suffix indicates sample dilution
 VOCs Volatile Organic Compounds
 X-1 is the field replicate of LaPlace

Table 6. Summary of Detected Concentrations of Volatile Organic Compounds in Ground-Water Samples Collected from September 1990 to June 1991 at Tutu, St. Thomas, U.S. Virgin Islands.

Analyte	Sample ID: Dede	Dench	Eglin I	Eglin I	Eglin I	Eglin II	Eglin II	Eglin II	Eglin III	Eglin III	Eglin III FR	Eglin III
	Date: 5-Feb-91	25-Sep-90	2-Oct-90	5-Feb-91	5-Jun-91	27-Sep-90	5-Feb-91	5-Jun-91	27-Sep-91	5-Feb-91	5-Feb-91	5-Jun-91
Chloromethane	.9J	1J	R	R	R	R	R	R	R	R	R	R
Acetone	R	R	R	R	R	R	R	R	22J	ND	R	ND
1,2-Dichloroethane	.6J	ND	R	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethene (total)	ND	ND	68 J	60 J	68 DJ	120J	72 DJ	130 DJ	52 J	45 J	45 J	69 D
Trichloroethene	ND	ND	10 J	8	10 J	22 J	19	19 J	14	11	13	15 J
1,1,2-Trichloroethane	ND	ND	R	ND	1J	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	32 J	26	32 J	71 J	34 DJ	61 DJ	44 J	35	36	40 J
Xylenes (Total)	ND	ND	R	1J	R	ND	ND	R	ND	ND	ND	ND

Analyte concentrations in micrograms per liter [parts per billion (ppb)].

Analyses were performed by Ceimic Corporation, Narragansett, Rhode Island, using USEPA Method 524.2.

D Compound was quantified using a secondary dilution by USEPA Method 624.

J Result was detected below the reporting limit or is an estimated concentration.

R Result is unusable and rejected. (Note: Compound may or may not be present.)

FR Sample ID suffix denotes Field Replicate of previous sample.

ND Compound not detected

TUT 002 2330

Table 6. Summary of Detected Concentrations of Volatile Organic Compounds in Ground-Water Samples Collected from September 1990 to June 1991 at Tutu, St. Thomas, U.S. Virgin Islands.

Analyte	Sample ID	Four Winds II	Four Winds II FR	Four Winds II	Four Winds II	Gassett	Hartman II	Hartman II	Hartman II	Hartman III
	Date:	26-Sep-90	26-Sep-90	5-Feb-91	5-Jun-91	5-Feb-91	26-Sep-90	5-Feb-91	4-Jun-91	26-Sep-91
1,2-Dichloroethene (total)		75 J	61 J	230 D	130 DJ	ND	5 J	5 J	6 J	2
Trichloroethene		6 J	4 J	21	12 J	1	1J	2	1J	ND
Tetrachloroethene		25 J	18 J	90 D	34 DJ	ND	7 J	9	7 J	1 J
Toluene		ND	ND	ND	ND	44 D	ND	ND	ND	ND

Analyte concentrations in micrograms per liter [parts per billion (ppb)].

Analyses were performed by Ceimic Corporation, Narragansett, Rhode Island, using USEPA Method 524.2.

D Compound was quantified using a secondary dilution by USEPA method 624.

J Result was detected below the reporting limit or is an estimated concentration.

R Result is unusable and rejected. (Note: Compound may or may not be present.)

FR Sample ID suffix denotes Field Replicate of previous sample.

ND Compound not Detected

TUT 002 2531

Table 6. Summary of Detected Concentrations of Volatile Organic Compounds in Ground-Water Samples Collected from September 1990 to June 1991 at Tutu, St. Thomas, U.S. Virgin Islands.

	Sample ID:	Hartman III	Harvey	Harvey	Harvey	Laplace	LaPlace	LaPlace FR	LaPlace
Analyte	Date:	5-Feb-91	26-Sep-90	5-Feb-91	4-Jun-91	2-Oct-90	5-Feb-91	5-Feb-91	6-Jun-91
Vinyl Chloride		ND	ND	ND	3	R	ND	ND	ND
Acetone		ND	R	ND	R	R	R	R	R
1,2-Dichloroethene (total)		ND	ND	160	80 DJ	140DJ	200 D	190 D	250 DEJ
Chloroform		ND	ND	ND	ND	R	1	ND	2
Trichloroethane		ND	ND	60 J	36 DJ	24 J	32	31	31 D
1,1,2-Trichloroethene		ND	ND	ND	ND	R	ND	ND	5
Tetrachloroethene		1	890 J	1500	530 DEJ	98 J	110 D	100 D	88 DJ
Chloromethane		ND	ND	ND	ND	R	ND	ND	ND

Analyte concentrations in micrograms per liter [parts per billion (ppb)].

Analyses were performed by Ceimic Corporation, Narragansett, Rhode Island, using USEPA Method 524.2.

D Compound was quantified using a secondary dilution by USEPA method 624.

E Result is outside the calibration range.

J Result was detected below the reporting limit or is an estimated concentration.

R Result is unusable and rejected. (Note: Compound may or may not be present.)

FR Sample ID suffix denotes Field Replicate of previous sample.

ND Compound not detected

TUT 002 2332

Table 6. Summary of Detected Concentrations of Volatile Organic Compounds in Ground-Water Samples Collected from September 1990 to June 1991 at Tutu, St. Thomas, U.S. Virgin Islands.

Analyte	Sample ID: LaPlace FR Date: 6-Jun-91	Matthias 1-Oct-90	Matthias 5-Feb-91	Matthias 6-Jun-91	Ramsay 1-Oct-90	Ramsay 5-Feb-91	Ramsay 5-Jun-91	Smith 2-Sep-90	Smith 5-Feb-91
Acetone	R	R	ND	ND	R	R	15 J	ND	R
1,2-Dichloroethene (total)	170 DJ	22	21	36 J	ND	1 J	2 J	58	42 J
Chloroform	0.8 J	ND	ND	ND	ND	ND	1	ND	ND
Trichloroethene	32 J	11	7 J	12	ND	1	ND	20	23
1,1,2-Trichloroethene	ND	ND	ND	4	ND	ND	R	ND	5
Tetrachloroethene	64 DJ	120 J	76	59 D	3 J	16	16	330 J	160 J
Chloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND

Analyte concentrations in micrograms per liter [parts per billion (ppb)].

Analyses were performed by Ceimic Corporation, Narragansett, Rhode Island, using USEPA Method 524.2.

D Compound was quantified using a secondary dilution by USEPA method 624.

J Result was detected below the reporting limit or is an estimated concentration.

R Result is unusable and rejected. (Note: Compound may or may not be present.)

FR Sample ID suffix denotes Field Replicate of previous sample.

ND Compound not detected

TUT 002 2333

Table 6 Summary of Detected Concentrations of Volatile Organic Compounds in Ground-Water Samples Collected from September 1990 to June 1991 at Tutu, St. Thomas, U.S. Virgin Islands.

Sample ID:	Smith	Steele	Steele	Steele	Fillett	Fillett FR	Fillett	Fillett	VIIIA I	VIIIA III	
Analyte	Date:	6-Jun-91	25-Sep-90	5-Feb-91	5-Jun-91	2-Oct-90	2-Oct-90	5-Feb-91	5-Jun-91	27-Sep-90	26-Sep-90
Vinyl Chloride	ND	ND	ND	4	17 J	12 J	7	5	ND	ND	
1,2-Dichloroethene (total)	62 D	120	44	180 DJ	280 J	270 J	200 D	400 DEFJ	6 J	ND	
Chloroform	ND	ND	ND	ND	R	R	ND	0.9	ND	3 J	
Trichloroethene	26	48	12	42 DJ	56 J	47 J	36	72 DJ	ND	ND	
1,1,2-Trichloroethene	ND	ND	ND	ND	R	R	ND	4	ND	ND	
Tetrachloroethene	190 D	130 J	65	150 DJ	120 J	98 J	100 D	180 DJ	5 J	ND	
Chloromethane	ND	ND	ND	ND	R	R	ND	ND	ND	ND	
Benzene	ND	ND	ND	ND	32 J	26 J	27	3 J	ND	ND	
Toluene	ND	ND	ND	ND	R	R	1	0.8 J	ND	ND	
Ethylbenzene	ND	ND	ND	ND	R	R	1	ND	ND	ND	

Analyte concentrations in micrograms per liter [parts per billion (ppb)].

Analyses were performed by Ceimic Corporation, Narragansett, Rhode Island, using USEPA Method 524.2.

D Compound was quantified using a secondary dilution by USEPA method 624.

F Result is outside the calibration range.

J Result was detected below the reporting limit or is an estimated concentration.

R Result is unusable and rejected. (Note: Compound may or may not be present.)

FR Sample ID suffix denotes Field Replicate of previous sample.

ND Compound not detected

PRODS

TUT 002 2334

GERAGHTY & MILLER, INC.

Table 7. Comparative Results of Analysis for Volatile Organic Compounds in Ground-Water Samples Collected from September 1990 to June 1991 at the Tutu Wells Site, St. Thomas, U.S Virgin Islands.

Analyte	Sample ID	Eglin I Date	Eglin I 2-Oct-90	Eglin I 5-Feb-91	Eglin I 5-Jun-91	Eglin II 27-Sep-90	Eglin II 5-Feb-91	Eglin II 5-Jun-91	Eglin III 27-Sep-90	Eglin III 5-Feb-91	Eglin III 5-Feb-91 FR	Eglin III 5-Jun-91	Four Winds II 26-Sep-90	Four Winds II 26-Sep-90 FR	Four Winds II 5-Feb-91
Chloromethane		R		2 UJ	R	10 UJ	2 UJ	R	10 UJ	2 UJ	2 U	1 UJ	5 UJ	5 UJ	2 U
Bromomethane		R		R	R	10 UJ	R	R	10 UJ	R	2 UJ	1 UJ	5 UJ	5 UJ	2 UJ
Vinyl chloride		R		R	R	10 UJ	R	R	10 UJ	R	2 UJ	1 UJ	5 UJ	5 UJ	2 UJ
Chloroethane		R		R	R	10 UJ	R	R	10 UJ	R	2 UJ	1 UJ	5 UJ	5 UJ	2 UJ
Methylene chloride		R		1 U	R	5 UJ	1 U	R	10 UJ	1 U	1 U	0.5 UJ	14 UJ	10 UJ	1 U
Acetone		R		R	R	R	R	R	22 J	R	R	2 UJ	R	R	R
Carbon disulfide		R		1 UJ	R	5 UJ	1 UJ	R	5 UJ	1 UJ	1 UJ	0.5 UJ	2 UJ	2 UJ	1 UJ
1,1-Dichloroethene		R		1 U	R	5 UJ	1 U	R	5 UJ	1 U	1 U	0.5 UJ	2 UJ	2 UJ	1 U
1,1-Dichloroethane		R		1 U	R	5 UJ	1 U	R	5 U	1 U	1 U	0.5 UJ	2 UJ	2 UJ	1 U
1,2-Dichloroethene (total)		68 J		60 J	68 DJ	120 J	72 DJ	130 DJ	52 J	45 J	45 J	69 DJ	75 J	61 J	230 D
Chloroform		R		1 U	R	5 UJ	1 U	R	5 U	1 U	1 U	0.5 UJ	2 UJ	2 UJ	1 U
1,2-Dichloroethane		R		1 UJ	R	5 UJ	1 UJ	R	5 UJ	1 UJ	1 U	0.5 UJ	2 UJ	2 UJ	1 U
2-Butanone		R		R	R	R	R	R	R	R	R	R	R	R	R
1,1,1-Trichloroethane		R		1 UJ	R	5 UJ	1 UJ	R	5 U	1 UJ	1 U	0.5 UJ	2 UJ	2 UJ	1 U
Carbon tetrachloride		R		1 U	R	5 UJ	1 U	R	5 U	1 U	1 U	0.5 UJ	2 UJ	2 UJ	1 U
Vinyl acetate		R		2 UJ	R	10 UJ	2 UJ	R	10 UJ	2 UJ	2 UJ	1 UJ	5 UJ	5 UJ	2 UJ
Bromodichloromethane		R		1 UJ	R	5 UJ	1 UJ	R	5 UJ	1 UJ	1 U	0.5 UJ	2 UJ	2 UJ	1 U
1,2-Dichloropropane		R		1 U	R	5 UJ	1 U	R	5 UJ	1 U	1 U	0.5 UJ	2 UJ	2 UJ	1 U
cis-1,3-Dichloropropene		R		1 U	R	5 UJ	1 U	R	5 UJ	1 U	1 U	0.5 UJ	2 UJ	2 UJ	1 U
Trichloroethene		10 J		8	10 J	22 J	19	19 J	14	11	13	15 J	6 J	4 J	21
Dibromochloromethane		R		1 UJ	R	5 UJ	1 UJ	R	5 UJ	1 UJ	1 U	0.5 UJ	2 UJ	2 UJ	1 U
1,1,2-Trichloroethane		R		1 U	1 J	5 UJ	1 U	R	5 UJ	1 U	1 U	0.5 UJ	2 UJ	2 UJ	1 U
Benzene		R		1 UJ	R	5 UJ	1 UJ	R	5 UJ	1 UJ	1 U	0.5 UJ	2 UJ	2 UJ	1 UJ
trans-1,3-Dichloropropene		R		R	R	5 UJ	R	R	5 UJ	R	R	0.5 UJ	2 UJ	2 UJ	R
Bromoform		R		R	R	5 UJ	R	R	5 UJ	R	1 U	0.5 UJ	2 UJ	2 UJ	1 U
4-Methyl-2-pentanone		R		2 UJ	R	10 UJ	2 UJ	R	10 UJ	2 UJ	2 UJ	1 UJ	5 UJ	5 UJ	2 UJ
2-Hexanone		R		2 UJ	R	R	2 UJ	R	R	2 UJ	2 UJ	1 UJ	R	R	2 UJ
Tetrachloroethene		32 J		26	32 J	71 J	34 DJ	61 DJ	44 J	35	36	40 J	25 J	18 J	90 D
1,1,2,2-Tetrachloroethane		R		R	R	5 UJ	R	R	5 UJ	R	1 U	0.5 UJ	2 UJ	2 UJ	1 U
Toluene		R		1 UJ	R	5 UJ	1 UJ	R	5 UJ	1 UJ	1 U	0.5 UJ	2 UJ	2 UJ	1 UJ
Chlorobenzene		R		1 U	R	5 UJ	1 U	R	5 UJ	1 U	1 U	0.5 UJ	2 UJ	2 UJ	1 UJ
Ethylbenzene		R		1 UJ	R	5 UJ	1 UJ	R	5 UJ	1 UJ	1 U	0.5 UJ	2 UJ	2 UJ	1 UJ
Styrene		R		1 UJ	R	5 UJ	1 UJ	R	5 UJ	1 UJ	1 UJ	0.5 UJ	2 UJ	2 UJ	1 UJ
Xylenes (total)		R		1 J	R	5 UJ	1 UJ	R	5 UJ	1 UJ	1 UJ	0.5 UJ	2 UJ	2 UJ	1 UJ

Analyte concentrations in micrograms per liter [parts per billion (ppb)].

Analyses were performed by Ceimic Corporation, Narragansett, Rhode Island, using USEPA Method 524.2.

- D Compound was quantified using a secondary dilution by USEPA Method 624.
 E Result is outside the calibration range.
 J Result was detected below the reporting limit or is an estimated concentration.
 R Result is unusable and rejected. (Note: Compound may or may not be present.)
 U Compound was analyzed for but was not detected.
 FR Sample ID suffix denotes Field Replicate of previous sample.

Table 7. Comparative Results of Analysis for Volatile Organic Compounds in Ground-Water Samples Collected from September 1990 to June 1991 at the Tutu Wells Site, St. Thomas, U.S Virgin Islands.

Analyte	Sample ID Date	Four Winds II 5-Jun-91	Gassett 5-Feb-91	Gassett 4-Jun-91	Hartman II 26-Sep-90	Hartman II 5-Feb-91	Hartman II 4-Jun-91	Hartman III 26-Sep-90	Hartman III 5-Feb-91	Hartman III 4-Jun-91	Harvey 26-Sep-90	Harvey 5-Feb-91	Harvey 4-Jun-91	LaPlace 2-Oct-90
Chloromethane		1 UJ	2 UJ	2 UJ	2 UJ	2 U	1 UJ	2 UJ	2 U	1 U	100 U	200 U	1 U	R
Bromomethane		1 UJ	2 UJ	1 UJ	2 U	2 U	1 UJ	2 UJ	2 UJ	1 U	100 U	200 U	1 U	R
Vinyl chloride		1 UJ	2 UJ	1 UJ	2 U	2 U	1 UJ	2 UJ	2 UJ	1 UJ	100 UJ	200 U	3	R
Chloroethane		1 UJ	2 UJ	1 UJ	2 UJ	2 U	1 UJ	2 UJ	2 UJ	1 U	100 U	200 U	1 U	R
Methylene chloride		0.5 UJ	1 UJ	2 UJ	1 UJ	1 U	0.5 UJ	3 UJ	1 U	2 U	150 UJ	100 U	7 U	R
Acetone		R	R	10 UJ	R	R	R	R	R	8 UJ	R	200 U	R	R
Carbon disulfide		0.5 UJ	1 UJ	0.5 UJ	1 UJ	1 UJ	0.5 UJ	1 UJ	1 UJ	0.5 UJ	50 UJ	100 U	0.5 U	R
1,1-Dichloroethene		0.5 UJ	1 UJ	0.5 UJ	1 UJ	1 U	0.5 UJ	1 UJ	1 U	0.5 UJ	50 UJ	100 U	0.5 U	R
1,1-Dichloroethane		0.5 UJ	1 U	0.5 UJ	1 UJ	1 U	0.5 UJ	1 U	1 U	0.5 U	50 U	100 U	0.5 U	R
1,2-Dichloroethene (total)		130 DJ	1 U	0.5 UJ	5 J	5 J	6 J	2	1 U	0.5 U	50 UJ	160	80 DJ	140 J
Chloroform		0.5 UJ	1 U	0.5 UJ	1 UJ	1 U	0.5 UJ	1 UJ	1 U	0.5 U	50 U	100 U	0.5 U	R
1,2-Dichloroethane		0.5 UJ	1 UJ	1 UJ	1 UJ	1 U	0.5 UJ	1 UJ	1 U	1 U	50 UJ	100 U	0.5 U	R
2-Butanone		R	R	R	R	R	R	R	R	R	R	200 U	R	R
1,1,1-Trichloroethane		0.5 UJ	1 UJ	0.5 UJ	1 UJ	1 U	0.5 UJ	1 UJ	1 U	0.5 UJ	50 U	100 U	0.5 U	R
Carbon tetrachloride		0.5 UJ	1 U	0.5 UJ	1 UJ	1 U	0.5 UJ	1 U	1 U	0.5 UJ	50 U	100 U	0.5 UJ	R
Vinyl acetate		1 UJ	2 UJ	1 UJ	2 UJ	2 UJ	1 UJ	2 UJ	2 UJ	1 U	100 UJ	200 U	1 U	R
Bromodichloromethane		0.5 UJ	1 U	0.5 UJ	1 U	1 U	0.5 UJ	1 U	1 U	0.5 U	50 UJ	100 U	0.5 U	R
1,2-Dichloropropane		0.5 UJ	1 U	0.5 UJ	1 UJ	1 U	0.5 UJ	1 U	1 U	0.5 U	50 U	100 U	0.5 U	R
cis-1,3-Dichloropropene		0.5 UJ	1 U	0.5 UJ	1 UJ	R	0.5 UJ	1 UJ	1 U	0.5 U	50 UJ	100 U	0.5 U	R
Trichloroethene		12 J	1 U	0.5 UJ	1 J	2	1 J	1 U	1 U	0.5 UJ	50 U	60 J	36 DJ	24 J
Dibromochloromethane		0.5 UJ	1 U	0.5 UJ	1 UJ	1 U	0.5 UJ	1 U	1 U	0.5 U	50 U	100 U	0.5 U	R
1,1,2-Trichloroethane		0.5 UJ	1 UJ	0.5 UJ	1 UJ	1 U	0.5 UJ	1 U	1 U	0.5 U	50 U	100 U	0.5 U	R
Benzene		0.5 UJ	1 U	0.5 UJ	1 UJ	1 U	0.5 UJ	1 U	1 U	0.5 U	50 U	100 U	0.5 UJ	R
trans-1,3-Dichloropropene		0.5 UJ	1 UJ	0.5 UJ	1 UJ	1 U	0.5 UJ	1 UJ	R	0.5 U	50 U	100 U	0.5 U	R
Bromoform		0.5 UJ	1 UJ	0.5 UJ	1 UJ	1 U	0.5 UJ	1 UJ	1 U	0.5 U	50 UJ	100 U	0.5 U	R
4-Methyl-2-pentanone		1 UJ	1 UJ	1 UJ	2 UJ	2 UJ	1 UJ	2 UJ	2 UJ	1 U	100 UJ	200 U	1 U	R
2-Hexanone		1 UJ	R	1 UJ	R	2 UJ	1 UJ	R	2 UJ	1 U	R	200 U	1 U	R
Tetrachloroethene		34 DJ	1 UJ	0.5 UJ	7 J	9	7 J	1 J	1	0.5 U	890 J	1500	530 DEJ	98 J
1,1,2,2-Tetrachloroethane		0.5 UJ	1 UJ	0.5 UJ	1 UJ	1 U	0.5 UJ	1 UJ	1 U	0.5 U	50 UJ	100 U	0.5 U	R
Toluene		0.5 UJ	1 U	0.5 UJ	1 UJ	1 U	0.5 UJ	1 U	1 U	0.5 UJ	50 U	100 U	0.5 UJ	R
Chlorobenzene		0.5 UJ	1 U	0.5 UJ	1 UJ	1 U	0.5 UJ	1 U	1 U	0.5 U	50 U	100 U	0.5 UJ	R
Ethylbenzene		0.5 UJ	1 U	0.5 UJ	1 U	1 U	0.5 UJ	1 U	1 U	0.5 U	50 U	100 U	0.5 UJ	R
Styrene		0.5 UJ	1 UJ	0.5 UJ	1 U	1 U	0.5 UJ	1 UJ	1 UJ	0.5 U	50 U	100 U	0.5 UJ	R
Xylenes (total)		0.5 UJ	1 U	0.5 UJ	1 U	1 U	0.5 UJ	1 UJ	1 UJ	0.5 U	50 UJ	100 U	0.5 UJ	R

Analyte concentrations in micrograms per liter [parts per billion (ppb)].

Analyses were performed by Ceimic Corporation, Narragansett, Rhode Island, using USEPA Method 524.2.

- D Compound was quantified using a secondary dilution by USEPA Method 624.
 E Result is outside the calibration range.
 J Result was detected below the reporting limit or is an estimated concentration.
 R Result is unusable and rejected. (Note: Compound may or may not be present.)
 U Compound was analyzed for but was not detected.
 FR Sample ID suffix denotes Field Replicate of previous sample.

Table 7. Comparative Results of Analysis for Volatile Organic Compounds in Ground-Water Samples Collected from September 1990 to June 1991 at the Tutu Wells Site, St. Thomas, U.S Virgin Islands.

Analyte	Sample ID	LaPlace	LaPlace FR	LaPlace	LaPlace FR	Matthias	Matthias	Matthias	Ramsay	Ramsay	Ramsay	Smith	Smith	Smith
	Date	5-Feb-91	5-Feb-91	6-Jun-91	6-Jun-91	1-Oct-90	5-Feb-91	6-Jun-91	1-Oct-90	5-Feb-91	5-Jun-91	25-Sep-90	5-Feb-91	6-Jun-91
Chloromethane		2 U	2 U	1 UJ	1 UJ	2 UJ	25 U	1 UJ	4 UJ	2 UJ	2 UJ	25 U	2 UJ	1 UJ
Bromomethane		2 U	2 U	1 UJ	1 UJ	2 UJ	25 U	1 UJ	4 UJ	R	R	25 U	R	1 UJ
Vinyl chloride		2 U	2 U	1 UJ	1 UJ	2 UJ	25 U	1 UJ	4 UJ	R	R	25 U	R	1 UJ
Chloroethane		R	R	1 UJ	1 UJ	2 UJ	25 U	1 UJ	4 UJ	R	R	25 U	R	1 UJ
Methylene chloride		1 U	1 U	3 UJ	1 UJ	9 UJ	25 U	2 UJ	17 UJ	1 U	R	12 UJ	1 U	1 UJ
Acetone		R	R	R	R	R	25 U	2 UJ	R	R	15 J	25 UJ	R	R
Carbon disulfide		1 UJ	1 UJ	0.5 UJ	0.5 UJ	1 UJ	12 UJ	0.5 UJ	2 UJ	1 UJ	R	12 UJ	1 UJ	0.5 UJ
1,1-Dichloroethene		1 U	1 U	0.5 U	0.5 UJ	1 UJ	12 U	0.5 U	2 UJ	1 U	R	12 UJ	1 U	0.5 UJ
1,1-Dichloroethane		1 U	1 U	0.5 U	0.5 UJ	1 U	12 U	0.5 U	2 UJ	1 U	R	12 U	1 U	0.5 UJ
1,2-Dichloroethene (total)		200 D	190 D	250 DEJ	170 DJ	22	21	36 J	2 UJ	1 J	2 J	58	42 J	62 D
Chloroform		1	1 U	2	0.8 J	1 UJ	12 U	0.5 U	2 UJ	1 U	1 J	12 U	1 U	0.5 UJ
1,2-Dichloroethane		1 U	1 U	0.5 U	0.5 UJ	1 UJ	12 U	0.5 U	2 UJ	1 U	1 UJ	12 UJ	1 U	0.5 UJ
2-Butanone		R	R	R	R	R	25 U	R	R	R	R	25 UJ	R	R
1,1,1-Trichloroethane		1 U	1 U	0.5 U	0.5 UJ	1 UJ	12 U	0.5 U	2 UJ	1 U	R	12 U	1 U	0.5 UJ
Carbon tetrachloride		1 U	1 U	0.5 UJ	0.5 UJ	1 U	12 U	0.5 UJ	2 UJ	1 U	R	12 U	1 U	0.5 UJ
Vinyl acetate		R	R	R	1 UJ	2 UJ	25 U	R	4 UJ	2 U	R	25 UJ	2 UJ	1 UJ
Bromodichloromethane		1 U	1 U	0.5 U	0.5 UJ	1 U	12 U	0.5 U	2 UJ	1 U	R	12 U	1 U	0.5 UJ
1,2-Dichloropropane		1 U	1 U	0.5 U	0.5 UJ	1 U	12 U	0.5 U	2 UJ	1 U	R	12 U	1 U	0.5 UJ
cis-1,3-Dichloropropene		R	R	0.5 U	0.5 UJ	1 UJ	12 U	0.5 U	2 UJ	R	R	12 U	1 U	0.5 UJ
Trichloroethene		32	31	31 D	32 J	11	7 J	12	2 UJ	1	R	20	23	26
Dibromochloromethane		1 U	1 U	0.5 U	0.5 UJ	1 U	12 U	0.5 U	2 UJ	1 U	R	12 U	1 U	0.5 UJ
1,1,2-Trichloroethane		1 U	1 U	5	0.5 UJ	1 U	12 U	4	2 UJ	1 U	R	12 U	5	0.5 UJ
Benzene		1 U	1 U	0.5 U	0.5 UJ	1 U	12 U	0.5 U	2 UJ	1 U	R	12 U	1 U	0.5 UJ
trans-1,3-Dichloropropene		1 U	1 U	0.5 U	0.5 UJ	1 UJ	12 U	0.5 U	2 UJ	1 U	R	R	R	0.5 UJ
Bromoform		1 U	1 U	0.5 UJ	0.5 UJ	1 U	12 U	0.5 UJ	2 UJ	1 U	R	12 UJ	1 U	0.5 UJ
4-Methyl-2-pentanone		2 UJ	2 UJ	1 U	1 UJ	2 UJ	25 U	1 U	4 UJ	2 UJ	R	25 UJ	2 UJ	1 UJ
2-Hexanone		2 UJ	2 UJ	1 U	1 UJ	R	25 U	1 U	R	R	R	25 UJ	2 UJ	1 UJ
Tetrachloroethene		110 D	100 D	88 DJ	64 DJ	120 J	76	59 DJ	3 J	16	16	330 J	160 J	190 D
1,1,2,2-Tetrachloroethane		1 U	1 U	0.5 U	0.5 UJ	1 UJ	12 U	0.5 U	2 UJ	1 U	R	12 UJ	1 U	0.5 UJ
Toluene		1 U	1 U	4 UJ	3 UJ	1 U	12 U	0.5 UJ	2 UJ	1 U	R	12 U	1 U	0.5 UJ
Chlorobenzene		1 U	1 U	0.5 UJ	0.5 UJ	1 U	12 U	0.5 UJ	2 UJ	1 U	R	12 U	1 U	0.5 UJ
Ethylbenzene		1 U	1 U	0.5 UJ	0.5 UJ	1 U	12 U	0.5 UJ	2 UJ	1 U	R	12 U	1 U	0.5 UJ
Styrene		1 U	1 U	0.5 UJ	0.5 UJ	1 UJ	12 U	0.5 UJ	2 UJ	1 U	R	12 U	1 UJ	0.5 UJ
Xylenes (total)		1 U	1 U	0.5 UJ	0.5 UJ	1 UJ	12 U	0.5 UJ	2 UJ	1 U	R	12 U	1 UJ	0.5 UJ

Analyte concentrations in micrograms per liter [parts per billion (ppb)].
Analyses were performed by Cemic Corporation, Narragansett, Rhode Island, using USEPA Method 524.2.

D Compound was quantified using a secondary dilution by USEPA Method 624.
E Result is outside the calibration range.
J Result was detected below the reporting limit or is an estimated concentration.
R Result is unusable and rejected. (Note: Compound may or may not be present.)
U Compound was analyzed for but was not detected.
FR Sample ID suffix denotes Field Replicate of previous sample.

Table 7. Comparative Results of Analysis for Volatile Organic Compounds in Ground-Water Samples Collected from September 1990 to June 1991 at the Tutu Wells Site, St. Thomas, U.S Virgin Islands.

Analyte	Sample ID	Steele	Steele	Steele	Tillet	Tillet FR	Tillet	Tillet	Deionized Water	Equipment Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank
	Date	25-Sep-90	5-Feb-91	5-Jun-91	2-Oct-90	2-Oct-90	5-Feb-91	5-Jun-91	4-Jun-91	4-Jun-91	24-Sep-90	25-Sep-90	26-Sep-90	27-Sep-90
Chloromethane		17 UJ	10 U	1 UJ	R	R	2 U	1 U	0.9 J	1 UJ	2 U	2 U	2 UJ	2 UJ
Bromomethane		17 UJ	10 U	1 U	R	R	2 U	1 U	1 U	1 UJ	2 U	2 U	2 UJ	2 UJ
Vinyl chloride		17 UJ	10 U	4	17 J	12 J	7	5	1 U	1 UJ	2 U	2 U	2 UJ	2 UJ
Chloroethane		17 UJ	10 U	1 UJ	R	R	2 U	1 U	1 U	1 UJ	2 U	2 U	2 UJ	2 UJ
Methylene chloride		140 UJ	5 U	0.5 UJ	R	R	1 U	5 U	1	1 J	25 J	34 J	24 J	16 J
Acetone		R	10 U	R	R	R	R	R	8 J	7 J	12 J	42 J	4 J	R
Carbon disulfide		8 UJ	5 U	0.5 U	R	R	1 UJ	0.5 U	0.5 U	0.5 UJ	1 UJ	1 UJ	1 UJ	1 UJ
1,1-Dichloroethene		8 UJ	5 U	0.5 U	R	R	1 U	0.5 U	0.5 U	0.5 UJ	1 UJ	1 UJ	1 UJ	1 UJ
1,1-Dichloroethane		8 U	5 U	0.5 U	R	R	1 U	0.5 U	0.5 U	0.5 UJ	1 UJ	1 UJ	1 U	1 U
1,2-Dichloroethene (total)		120	44	180 DJ	280 J	270 J	200 D	400 DEJ	0.5 U	0.5 UJ	1 UJ	1 UJ	1 U	1 U
Chloroform		8 UJ	5 U	0.5 U	R	R	1 U	0.9	53 D	43 UJ	1 UJ	1 UJ	1 UJ	1 U
1,2-Dichloroethane		8 UJ	5 U	0.5 U	R	R	1 U	0.5 U	1	1 J	1 UJ	1 UJ	1 UJ	1 UJ
2-Butanone		R	10 U	R	R	R	R	R	R	R	R	R	R	R
1,1,1-Trichloroethane		8 UJ	5 U	0.5 U	R	R	1 U	0.5 U	0.5 U	0.5 UJ	1 UJ	1 UJ	1 UJ	1 UJ
Carbon tetrachloride		8 U	5 U	0.5 U	R	R	1 U	0.5 UJ	0.5 U	0.5 UJ	1 UJ	1 UJ	1 U	1 U
Vinyl acetate		17 UJ	10 UJ	1 U	R	R	2 UJ	1 U	1 U	1 UJ	R	R	2 UJ	2 UJ
Bromodichloromethane		8 U	5 U	0.5 U	R	R	1 U	0.5 U	18	14 UJ	1 U	1 U	1 U	1 U
1,2-Dichloropropane		8 U	5 U	0.5 U	R	R	1 U	0.5 U	0.5 U	0.5 UJ	1 UJ	1 UJ	1 U	1 U
cis-1,3-Dichloropropene		8 UJ	5 U	0.5 U	R	R	R	0.5 U	0.5 U	0.5 UJ	1 U	1 U	1 UJ	1 U
Trichloroethene		48	12	42 DJ	56 J	47 J	36	72 DJ	0.5 U	0.5 UJ	1 UJ	1 UJ	1 U	1 U
Dibromochloromethane		8 U	5 U	0.5 U	R	R	1 U	0.5 U	5	4 UJ	1 UJ	1 UJ	1 U	1 U
1,1,2-Trichloroethane		8 U	5 U	0.5 U	R	R	1 U	4	0.5 U	0.5 UJ	1 UJ	1 UJ	1 U	1 UJ
Benzene		8 U	5 U	0.5 U	32 J	26 J	27	3 J	0.5 U	0.5 UJ	1 UJ	1 UJ	1 U	1 U
trans-1,3-Dichloropropene		8 UJ	5 U	0.5 U	R	R	1 U	0.5 U	0.5 U	0.5 UJ	1 UJ	1 UJ	1 UJ	1 UJ
Bromoform		8 UJ	5 U	0.5 U	R	R	1 U	0.5 U	0.5 U	0.5 UJ	1 UJ	1 UJ	1 UJ	1 UJ
4-Methyl-2-pentanone		17 UJ	10 U	1 U	R	R	2 UJ	1 U	1 U	1 UJ	2 UJ	2 UJ	1 UJ	2 UJ
2-Hexanone		R	10 U	1 U	R	R	2 UJ	1 U	1 U	1 UJ	R	R	R	R
Tetrachloroethene		130 J	65	150 DJ	120 J	98 J	100 D	180 DJ	0.5 U	0.5 UJ	1 UJ	1 UJ	1 UJ	1 UJ
1,1,2,2-Tetrachloroethane		8 UJ	5 U	0.5 U	R	R	1 U	0.5 U	0.5 U	0.5 UJ	1 UJ	1 UJ	1 UJ	1 UJ
Toluene		8 U	5 U	0.5 UJ	R	R	1	0.8 J	0.5 U	0.5 UJ	1 U	1 J	1 U	1 U
Chlorobenzene		8 U	5 U	0.5 UJ	R	R	1 U	0.5 UJ	0.5 U	0.5 UJ	1 UJ	1 UJ	1 U	1 U
Ethylbenzene		8 U	5 U	0.5 UJ	R	R	1	0.5 UJ	0.5 U	0.5 UJ	1 U	1 U	1 U	1 U
Styrene		8 UJ	5 U	0.5 UJ	R	R	1 U	0.5 UJ	0.5 U	0.5 UJ	1 UJ	1 UJ	1 UJ	1 UJ
Xylenes (total)		8 UJ	5 U	0.5 UJ	R	R	1 U	0.5 UJ	0.5 U	0.5 UJ	8	7	1 UJ	1 UJ

Analyte concentrations in micrograms per liter [parts per billion (ppb)].

Analyses were performed by Ceimic Corporation, Narragansett, Rhode Island, using USEPA Method 524.2.

- D Compound was quantified using a secondary dilution by USEPA Method 624.
 E Result is outside the calibration range.
 J Result was detected below the reporting limit or is an estimated concentration.
 R Result is unusable and rejected. (Note: Compound may or may not be present.)
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 FR Sample ID suffix denotes Field Replicate of previous sample.

Table 7. Comparative Results of Analysis for Volatile Organic Compounds in Ground-Water Samples Collected from September 1990 to June 1991 at the Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

	Sample ID	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank
Analyte	Date	1-Oct-90	2-Oct-90	3-Oct-90	4-Feb-91	5-Feb-91	6-Feb-91	7-Feb-91	4-Jun-91	5-Jun-91	6-Jun-91
Chloromethane		2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	1 J	1 J	9 J	2 J	6 J
Bromomethane		2 UJ	2 UJ	2 UJ	R	R	2 U	2 U	1 UJ	1 UJ	1 UJ
Vinyl chloride		2 UJ	2 UJ	2 UJ	R	R	2 U	2 U	1 UJ	1 UJ	1 UJ
Chloroethane		2 UJ	2 UJ	2 UJ	R	R	2 U	2 U	1 UJ	1 UJ	1 UJ
Methylene chloride		13 J	14 J	1 UJ	2	3	2	2	0.8 J	1 UJ	0.9 J
Acetone		6 J	7 J	R	R	R	R	R	11 J	R	8 J
Carbon disulfide		1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	0.5 UJ	0.5 UJ	0.5 UJ
1,1-Dichloroethene		1 UJ	1 UJ	1 UJ	1 U	1 U	1 U	1 U	0.5 U	0.5 UJ	0.5 U
1,1-Dichloroethane		1 UJ	1 UJ	1 UJ	1 U	1 U	1 U	1 U	0.5 U	0.5 UJ	0.5 U
1,2-Dichloroethene (total)		1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	0.5 U	0.5 UJ	0.5 U
Chloroform		1 UJ	1 UJ	1 UJ	1 U	1 U	1 U	1 U	0.5 U	0.5 UJ	0.5 U
1,2-Dichloroethane		1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	2	1 J	2
2-Butanone		R	R	R	R	R	R	R	R	R	R
1,1,1-Trichloroethane		1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	0.5 U	0.5 UJ	0.5 U
Carbon tetrachloride		1 UJ	1 UJ	1 UJ	1 U	1 U	1 U	1 U	0.5 UJ	0.5 UJ	0.5 UJ
Vinyl acetate		2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	R	1 UJ	R
Bromodichloromethane		1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	0.5 U	0.5 UJ	0.5 U
1,2-Dichloropropane		1 UJ	1 UJ	1 UJ	1 U	1 U	1 U	1 U	0.5 U	0.5 UJ	0.5 U
cis-1,3-Dichloropropene		1 UJ	1 UJ	1 UJ	1 U	1 U	R	R	0.5 U	0.5 UJ	0.5 U
Trichloroethene		1 UJ	1 UJ	1 UJ	1 U	1 U	1 U	1 U	0.5 U	0.5 UJ	0.5 U
Dibromochloromethane		1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	0.5 U	0.5 UJ	0.5 U
1,1,2-Trichloroethane		1 UJ	1 UJ	1 UJ	1 U	1 U	1 U	1 U	0.5 U	0.5 UJ	0.5 U
Benzene		1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	0.5 U	0.5 UJ	0.5 U
trans-1,3-Dichloropropene		R	R	1 UJ	R	R	1 U	1 U	0.5 U	0.5 UJ	0.5 U
Bromoform		1 UJ	1 UJ	1 UJ	R	R	1 U	1 U	0.5 UJ	0.5 UJ	0.5 UJ
4-Methyl-2-pentanone		2 UJ	2 UJ	2 UJ	2 UJ	2 U	2 U	2 U	1 U	1 UJ	1 U
2-Hexanone		R	R	R	2 UJ	2 UJ	2 UJ	2 UJ	1 U	1 UJ	0.8 J
Tetrachloroethene		1 UJ	1 UJ	1 UJ	1 U	1 U	1 U	1 U	0.5 U	0.5 UJ	0.5 U
1,1,2,2-Tetrachloroethane		1 UJ	1 UJ	1 UJ	R	R	1 U	1 U	0.5 U	0.5 UJ	0.5 U
Toluene		1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	2	0.5 UJ	2
Chlorobenzene		1 UJ	1 UJ	1 UJ	1 U	1 U	1 U	1 U	0.5 U	0.5 UJ	0.5 U
Ethylbenzene		1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	0.5 U	0.5 UJ	0.5 U
Styrene		1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	0.5 U	0.5 UJ	0.5 U
Xylenes (total)		1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	0.5 U	0.5 UJ	0.5 U

Analyte concentrations in micrograms per liter [parts per billion (ppb)].

Analyses were performed by Ceimic Corporation, Narragansett, Rhode Island, using USEPA Method 524.2.

- D Compound was quantified using a secondary dilution by USEPA Method 624.
 E Result is outside the calibration range.
 J Result was detected below the reporting limit or is an estimated concentration.
 R Result is unusable and rejected. (Note: Compound may or may not be present.)
 U Compound was analyzed for but was not detected.
 FR Sample ID suffix denotes Field Replicate of previous sample.

Table 8. Proposed Sampling Effort for the Fourth Sampling Event, October 1991, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Well	Proposed Analytes
Eglin I	VOCs
Eglin II	VOCs
Eglin III	VOCs
Four Winds I	VOCs
Four Winds II (if possible)	VOCs
Gassett	VOCs
Hartman II	VOCs
Hartman III	VOCs
Harvey	VOCs
LaPlace	VOCs
Matthias	VOCs
Ramsay	VOCs
Smith	VOCs
Steele	VOCs
Tillett	VOCs
VIHA I or VIHA II (if possible)	VOCs

VOCs Volatile organic compounds.

Analysis will be performed using modified USEPA Method 524.2.

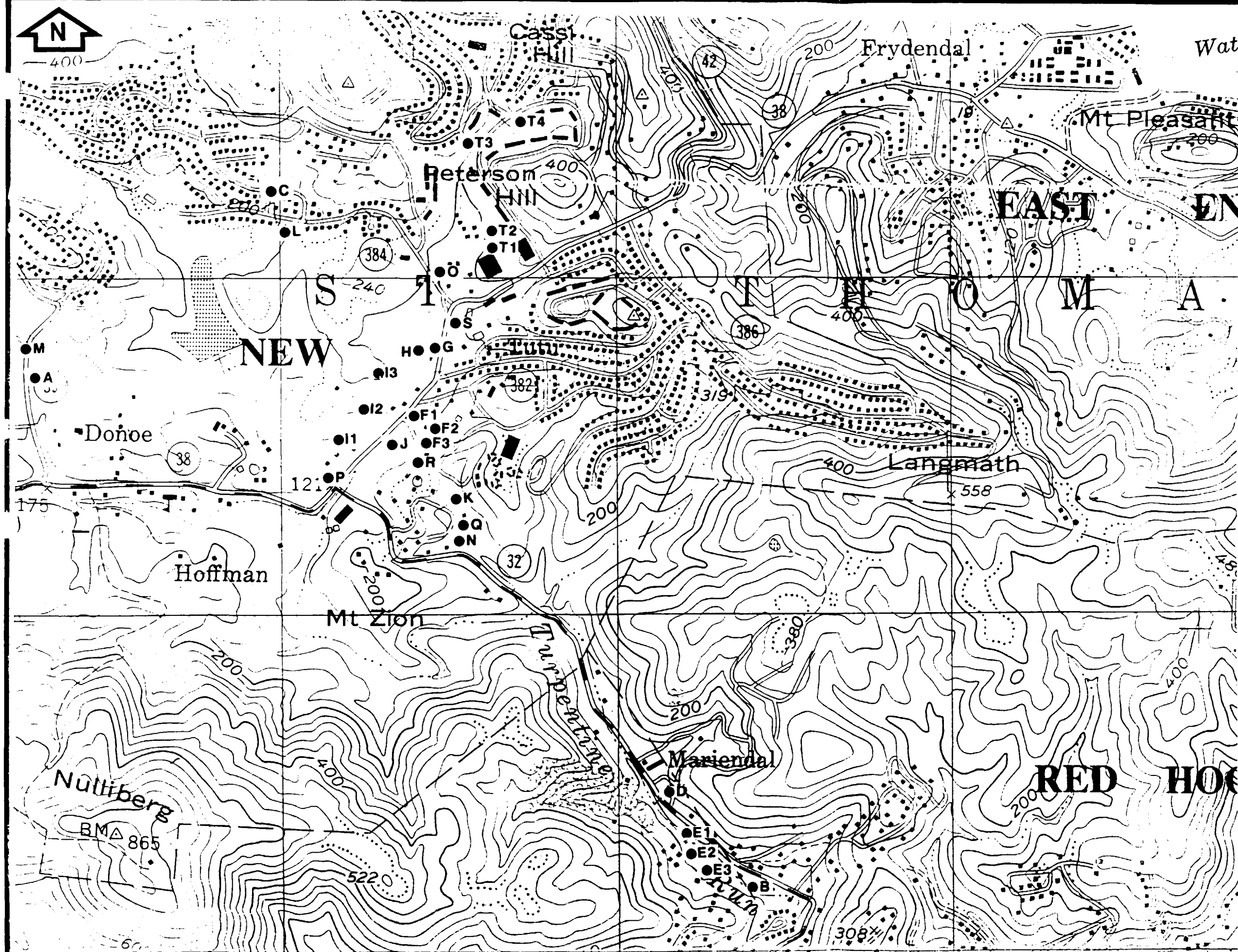
Four Winds II and VIHA I have inoperable pumps.

TD:gv
#PR00801/3rdqtr.rpt

111 002 2340

FIGURE

TUF 002 2341



LEGEND

- RESIDENTIAL WELL
- A BRYAN
- B DEDE
- C DEMITRI
- D DENCH
- E1 DEVCON I
- E2 DEVCON II (ALTERNATE)
- E3 DEVCON III
- F1 EGLIN I
- F2 EGLIN II
- F3 EGLIN III
- G FOUR WINDS I
- H FOUR WINDS II
- I1 GASSETT
- I2 HARTMAN II
- I3 HARTMAN III
- J HARVEY
- K LaPLACE
- L LEONARD
- M LOCKHART (ALTERNATE)
- N MATTHIAS
- O RAMSEY
- P RODRIGUES
- Q SMITH
- R STEELE
- S TILLET
- T1 VIHA I
- T2 VIHA II (ALTERNATE)
- T3 VIHA III
- T4 VIHA IV (ALTERNATE)

SUBJECT

WELL SAMPLING LOCATIONS,
TUTU WELLS SITE SAMPLING
ANALYSIS, AND MONITORING PLAN,
ST. THOMAS, USVI

PREPARED FOR

TEIC

Geraghty
& Miller, Inc.

COMPILED BY: DANNY
PREPARED BY: PAMELA
PROJECT MGR: DANNY

SCALE: SHOWN
DATE: 5/01

FIGURE
1

SOURCE: USGS QUADRANGLE EASTERN ST. THOMAS, V.I. (1954)

0 1000 2000 3000
SCALE FEET

APPENDIX A

**DATA VALIDATION SUMMARY
REPORT FOR THE TUTU WELLS SITE
JUNE 1991 SAMPLING EVENT
ST. THOMAS, U.S. VIRGIN ISLANDS**

DATA VALIDATION SUMMARY REPORT

for the

TUTU WELLS SITE

June 1991 Sampling

USEPA REGION II

Standard Operating Procedure HW-6

for the

Contract Laboratory Program

Organic Data Review

Sample Delivery Group 910299 (Eglin-I)

September 1991

Prepared for

Tutu Environmental Investigation Committee

**Geraghty & Miller, Inc.
201 West Passaic Street
Rochelle Park, New Jersey 07662**

STANDARD OPERATING PROCEDURE (SOP) NO. HW-6

Revision #7

**EVALUATION OF ORGANIC DATA FOR THE CONTRACT
LABORATORY PROGRAM (CLP)**

INTRODUCTION TO DATA VALIDATION

1.0 Scope

- 1.1 This procedure is applicable to organic data obtained from contractor laboratories working for the Contract Laboratory Program (CLP).
- 1.2 The data validation is based upon analytical and quality assurance requirements specified in the Statement of Work (SOW).

2.0 Responsibilities

Data reviewers will complete the following tasks as assigned by the Data Review Coordinator:

- 2.1 Data Assessment - The reviewer must answer every question on the checklist. All responses shall be in ink.
- 2.2 Data Assessment Narrative (Attachment 1) - Data reviewer is required to use these forms and must match the action in the narrative with the action taken on the Form I(s).
- 2.3 Rejection Summary Form (Attachment 2) - Fill in the total number of analytes measured by different analyses and the number of analytes rejected or flagged as estimated due to corresponding quality control criteria. Place an "X" in the boxes where analyses were not performed or criteria do not apply.
- 2.4 Organic Regional Data Assessment - Data reviewer is also required to fill out Organic Regional Data Assessment Form (Attachment 3).
- 2.5 Telephone Record Log - The data reviewer should enter the bare facts of inquiry before initiating an authorized telephone conversation with a CLP laboratory. After the case review has been completed, mail the white copy of the Telephone Record Log to the laboratory and the pink copy to SMO. Fill the yellow copy in the Telephone Record Log folder and attach a photocopy of the Telephone Record Log to the completed Data Assessment Narrative.
- 2.6 Forwarded Paperwork - Upon completion of the review, the following are to be forwarded to the Regional Sample Control Center (RSCC) located in the Surveillance and Monitoring Branch:
- a. data package
 - b. completed assessment checklist
 - c. SMO Contract Compliance Screening (CCS)

Forward four (4) copies of the completed Data Assessment Narrative along with four (4) copies of the Organic Data Assessment Form: one each for the appropriate Regional DPO, the Sample Management Office (SMO), and to the last two addresses of the Data Reviewers Mailing List.

- 2.7 Filed Paperwork - Upon completion of the review, the following are to be filed within the Monitoring and Management Branch (MMB) files:

-
- a. Telephone Record Log (copy)
 - b. Record of Communication (original)
 - c. Rejection Summary Form

3.0 Rejection of Data - All values determined to be unacceptable on the Organic Analysis Data Sheet (Form I) must be flagged with an "R". As soon as review criteria causes data to be rejected, that data can be eliminated from any further review or consideration.

4.0 Acceptance Criteria - In order that the reviews be consistent among reviewers, this Standard Operating Procedure (SOP) should be used. Additional guidance can be found in the Functional Guidelines.

5.0 SMO Contract Compliance Screening (CCS) - This is intended to aid the reviewer in locating any problems, both corrected and uncorrected. However, the validation should be carried out even if CCS is not present. Resubmittals received from the laboratory in response to CCS must be used by the reviewer.

PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: PR00801LAB: CAMIL CORPORATIONSITE: TUTU WELLS1.0 Data Completeness and Deliverables

Yes NO N/A

- 1.1 Have any missing deliverables been received and added to the data package.

[] — ☒

ACTION: Call lab for explanation/resubmittal of any missing deliverables. If lab cannot provide them, note the effort on review of the package under the "Contract Problems/Non-Compliance" section of reviewer narrative.

- 1.2 Was SMO CCS checklist included with package?

[] — ☒2.0 Cover Letter/Case Narrative

- 2.1 Is the Narrative or Cover Letter present?

☒ — —

- 2.2 Are Case Number and/or SAS number contained in the Narrative or Cover Letter?

☒ — —3.0 Data Validation Checklist

The following checklist is divided into three parts. Part A is filled out if the data package contains any VOA analyses, Part B for any BNA analyses and Part C for Pesticides/PCBs.

Does this package contain:

VOA data?

☒ —

BNA data?

— ☒

Pesticide/PCB data:

— ☒

ACTION: Complete corresponding parts of checklist.

YES NO N/A

PART A: VOA ANALYSES1.0 Traffic Reports and Laboratory Narrative

- 1.1 Are the Traffic Report Forms present for all samples?
- ☒
- ☐
- ☐

ACTION: If no, contact lab for replacement of missing or illegible copies.

- 1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data?
- ☒
- ☐
- ☐

ACTION: Use professional judgement to evaluate the effect on the quality of the data.

ACTION: If any sample analyzed as a soil contains more than 50% water, all data should be flagged as estimated (J).

ACTION: If both VOA vials for a sample have air bubbles, flag all positive results "J" and all non-detects "R".

2.0 Holding Times

- 2.1 Have any VOA holding times, determined from date of collection to date of analysis, been exceeded?
- ☒
- ☐
- ☐

If unpreserved, aqueous aromatic volatiles must be analyzed within 7 days of collection and non-aromatic volatiles must be analyzed within 14 days. If preserved with hydrochloric acid and stored at 4°C, then both aromatic and non-aromatic volatiles must be analyzed within 14 days. If uncertain about preservation, contact the sampler to determine whether the samples were preserved.

A ten-day holding time for soil samples is recommended.

Table of Holding Time Violations (see Table 5)

Sample	Sample Matrix	Preserved ?	(See Traffic Report)		Date Analyzed
			Date Sampled	Date Lab Received	
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

ACTION: If holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re-analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. The reviewer may determine that non-detect data are unusable ("R").

3.0 Surrogate Recovery (Form II) YES NO N/A

3.1 Are the VOA Surrogate Recovery Summaries (Form II) present for each of the following matrices:

a.	Low Water	☒	—	—
b.	Med Water	☐	—	☒
c.	Low Soil	☐	—	☒
d.	Med Soil	☐	—	☒

		YES	NO	N/A
3.2	Are all the VOA samples listed on the appropriate Surrogate Recovery Summaries for each of the following matrices:			

a.	Low Water	☒	☐	☐
----	-----------	-------------------------------------	--------------------------	--------------------------

b.	Med Water	☐	☐	☒
----	-----------	--------------------------	--------------------------	-------------------------------------

c.	Low Soil	☐	☐	☒
----	----------	--------------------------	--------------------------	-------------------------------------

d.	Med Soil	☐	☐	☒
----	----------	--------------------------	--------------------------	-------------------------------------

ACTION: Call lab for explanation/resubmittals. If missing deliverables are unavailable, document effect on data under "Conclusions" section of reviewer narrative.

3.3	Were outliers marked correctly with an asterisk?	☐	☒	☐
-----	--	--------------------------	-------------------------------------	--------------------------

ACTION: Circle all outliers in red.

3.4	Was one or more VOA surrogate recovery outside of contract specifications for any sample or method blank?	☒	☐	☐
-----	---	-------------------------------------	--------------------------	--------------------------

	If yes, were samples re-analyzed?	☐	☒	☐
--	-----------------------------------	--------------------------	-------------------------------------	--------------------------

	Were method blanks re-analyzed?	☐	☒	☐
--	---------------------------------	--------------------------	-------------------------------------	--------------------------

ACTION: If surrogate recoveries are > 10% but all do not meet SOW specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ").

Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and re-analyses. Check the internal standard areas.

3.5	Are there any transcription/calculation errors between raw data and Form II?	☐	☒	☐
-----	--	--------------------------	-------------------------------------	--------------------------

		YES	NO	N/A
ACTION:	If large errors exist, call lab for explanation/ resubmittal, make any necessary corrections and note errors under "Conclusions".			
4.0	<u>Matrix Spikes (Form III)</u>			
4.1	Is the Matrix Spike Duplicate/Recovery Form (Form III) present?	☒	—	—
4.2	Were matrix spikes analyzed at the required frequency for each of the following matrices:			
a.	Low Water	☒	—	—
b.	Med Water	☐	—	☒
c.	Low Soil	☐	—	☒
d.	Med Soil	☐	—	☒
ACTION:	If any matrix spike data are missing, take the action specified in 3.2 above.			
4.3	How many VOA spike recoveries are outside QC limits?			
	<u>Water</u>	<u>Soils</u>		
	<u>3</u> out of 10	<u>N/A</u> out of 10		
4.4	How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?			
	<u>Water</u>	<u>Soils</u>		
	<u>0</u> out of 5	<u>N/A</u> out of 5		
ACTION:	If MS and MSD both have less than 10% recovery for an analyte, negative results for that analyte should be rejected, and positive results should be flagged "J". The above applies only to the sample used for the MS/MSD analysis. Use professional judgement in applying this criterion to other samples in the package.			

		YES	NO	N/A
5.0	<u>Blanks (Form IV)</u>			
5.1	Is the Method Blank Summary (Form IV) present?	☒	—	—
5.2	Frequency of Analysis: for the analysis of VOA TCL compounds, has a reagent/method blank been analyzed for each set of samples or every 20 samples of similar matrix (low water, med water, low soil, medium soil), whichever is more frequent?	☒	—	—
5.3	Has a VOA instrument blank been analyzed at least once every twelve hours for each GC/MS system used?	☒	—	—
	ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, reject all positive data ("R").			
5.4	Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.			
	Is the chromatographic performance (baseline stability) for each instrument acceptable for VOAs?	☒	—	—
	ACTION: Use professional judgement to determine the effect on the data.			

6.0 Contamination

NOTE: "Water blanks" and "distilled water blanks" are not used to qualify data. Do not confuse them with the other QC blanks discussed below.

6.1	Do any method/instrument/reagent blanks have positive results (TCL and/or TIC) for VOAs? When applied as described below, the contaminant concentration in these blanks is multiplied by the sample Dilution Factor.	☒	☐	—
6.2	Do any field/trip/rinse blanks have positive VOA results (TCL and/or TIC)?	☒	☐	—
	ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)			

NOTE: Only field/rinse blanks taken the same day as the samples are used to qualify data. Trip blanks are used to qualify those samples with which they were shipped. Blanks may not be qualified because of contamination in another blank. Blanks may be qualified for surrogate, spectral, tuning or calibration QC problems.

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks.

	Sample conc > CRQL but < 10x blank	Sample conc < CRQL & is < 10x blank value	Sample conc > CRQL value & > 10x blank value
Methylene chloride Acetone Toluene 2-butanone	Flag sample result with a 'U'; cross out 'B' flag	Reject sample result and report CRQL; cross out 'B' flag	No qualification is needed
	Sample conc > CRQL but < 5x blank	Sample conc < CRQL & is < 5 x blank value	Sample conc > CRQL value & > 5 blank value
Other Contaminants	Flag sample result with a 'U'; cross out 'B' flag	Reject sample result and report CRQL; cross out 'B' flag	No qualification is needed

YES NO N/A

ACTION: For TIC compounds, if the concentration in the sample is less than five times the concentration in the most contaminated associated blank, flag the sample data "R" (unusable).

6.3 Are there field/rinse/equipment blanks associated with every sample?

☐ ☒ ☐

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

7.0 GC/MS Tuning and Mass Calibration (Form V)

7.1 Are the GC/MS Tuning and Mass Calibration Forms (Form V) present for Bromofluorobenzene (BFB)?

☒ ☐ ☐

7.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for BFB provided for each twelve hour shift?

YES NO N/A

[✓] — —

7.3 Has a tuning performance compound been analyzed for every twelve hours of sample analysis per instrument?

[✓] — —

ACTION: If any tuning data are missing, take action specified in 3.2 above.

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBER

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

7.4 Have an ion abundance criteria been met for each instrument used?

[✓] — —

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If tuning calibration is in error, flag all associated sample data as unusable ("R"), However, if expanded ion criteria are met (See 1988 Functional Guidelines), the data reviewer may accept data with appropriate qualifiers.

7.5 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.)

— [✓] —

7.6 Have the appropriate number of significant figures (two) been reported? (check at least two values, but if errors are found, check more values.)

[✓] — —

YES NO N/A

ACTION: If large errors exist, call lab for explanation/
resubmittal, make necessary corrections and note
errors under "Conclusions".

7.7 Are the spectra of mass calibration compound acceptable?

☒ ☐ ☐

ACTION: Use professional judgement to determine whether
associated data should be accepted, qualified,
or rejected.

8.0 Target Compound List (TCL) Analytes

8.1 Are the Organic Analysis Data Sheets (Form I VOA)
present with required header information on each
page, for each of the following:

a. Samples and/or fractions as appropriate

☒ ☐ ☐

b. Matrix spikes and matrix spike duplicates

☒ ☐ ☐

c. Blanks

☒ ☐ ☐

8.2 Are the VOA Reconstructed Ion Chromatograms, the mass
spectra for the identified compounds, and the data
system printouts (Quant Reports) included in the sample
package for each of the following?

a. Samples and/or fractions as appropriate

☒ ☐ ☐

b. Matrix spikes and matrix spike duplicates (Mass
spectra not required)

☒ ☐ ☐

c. Blanks

☒ ☐ ☐

ACTION: If any data are missing, take action
specified in 3.2 above.

8.3 Are the response factors shown in the Quant Report?

☐ ☒ ☐

8.4 Is chromatographic performance acceptable with respect to:

Baseline stability

☒ ☐ ☐

Resolution

☒ ☐ ☐

YES NO N/A

Peak shape

☒

—

—

Full-scale graph (attenuation)

☒

—

—

Other: _____

☐

—

☒

ACTION: Use professional judgement to determine the acceptability of the data.

- 8.5 Are the lab-generated standard mass spectra of the identified VOA compounds present for each sample?

☒

—

—

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If Lab does not generate their own standard spectra, make note in "Contract Problems/Non-compliance".

- 8.6 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?

☒

—

—

- 8.7 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum?

☒

—

—

- 8.8 Do sample and standard relative ion intensities agree within 20%?

☒

—

—

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identification were made, all such data should be rejected, flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected (at the calculated detection limit).

9.0 Tentatively Identified Compounds (TICs)

- 9.1 Are all Tentatively Identified Compound Forms (Form I, Part B) present; and do listed TICs include scan number or retention time, estimated concentration and "J" qualifier?

☒

—

—

- 9.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

- a. Samples and/or fractions as appropriate
- b. Blanks

YES	NO	N/A
☐	☐	☒
☒	☐	☐

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "J" qualifier if missing and "N" qualifier to all identified TIC compounds on Form I, Part B.

- 9.3 Are any TCL compounds (from any fraction) listed as TIC compounds (example: 1,2-dimethylbenzene is xylene - a VOA TCL - and should not be reported as a TIC)?

☐	☒	☐
--------------------------	-------------------------------------	--------------------------

ACTION: Flag with "R" any TCL compound listed as a TIC.

- 9.4 Are all ions present in the reference mass spectrum with a relatively greater 10% also present in the sample mass spectrum?

☒	☐	☐
-------------------------------------	--------------------------	--------------------------

- 9.5 Do TIC and "best match" standard relative ion intensities agree within 20%?

☒	☐	☐
-------------------------------------	--------------------------	--------------------------

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate.

10.0 Compound Quantitation and Reported Detection Limits

- 10.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, RRF were used to calculate Form I result. Were any errors found?
- 10.2 Are the CRQLs adjusted to reflect sample dilutions and, for soils, sample moisture?

☐	☒	☐
--------------------------	-------------------------------------	--------------------------

☒	☐	☐
-------------------------------------	--------------------------	--------------------------

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and

YES NO N/A

note errors under "Conclusions".

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQL data from other diluted sample analysis). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" value on the original Form I and substituting it with data from the analysis of diluted sample. Specify which Form I is to be used. then draw a red "X" across the entire page of all Form I's that should not be used, including any in the summary package.

11.0 Standard Data (GC/MS)

11.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant. Reports) present for initial and continuing calibration?

[☒] — —

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

12.0 GC/MS Initial Calibration (Form VI)

12.1 Are the Initial Calibration Forms (Form VI) present and complete for the volatile fraction?

[☒] — —

12.2 Are response factors stable for volatiles over the concentration range of the calibration (RSD <30%)?

[] [☒] —

ACTION: Circle all outliers in red.

ACTION: When RSD >30%, non-detects may be qualified using professional judgement. Flag all positive results "J". When RSD >90%, flag all non-detects as unusable ("R"). (Region II policy.)

12.3 Do any compounds have an average < 0.05?

[☒] [] —

ACTION: Circle all outliers in red.

ACTION: If any volatile compound has an average

YES NO N/A

RRF < 0.05, flag positive results for that compound as estimated ("J"), and flag non-detects for that compound as unusable ("R").

- 12.4 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or %RSD? (Check at least two values but if errors are found, check more.)

— [✓] —

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors under "Conclusions".

13.0 GC/MS Continuing Calibration (Form VII)

- 13.1 Are the Continuing Calibration Forms (Form VII) present and complete for the volatile fraction?

[✓] — —

- 13.2 Has a continuing calibration standard been analyzed for every twelve hours of sample analysis per instrument?

[✓] — —

ACTION: List below all sample analyses that were not within twelve hours of the previous continuing calibration analysis.

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

- 13.3 Do any continuing calibration standard compounds have a RRF < 0.05?

✓ [] —

ACTION: Circle all outliers in red.

ACTION: If any volatile compound has a RRF < 0.05, flag positive results for that compound as estimated ("J"), and flag non-detects for

YES NO N/A

that compound as unusable ("R").

13.4 Do any compounds have a % difference between initial and continuing calibration RRF > 25%?

☒ ☐ ☐

ACTION: Circle all outliers in red and qualify associated sample data as outlined in the table below:

% DIFFERENCE

25-50	50-90	> 90
'J' positive results, no action for non detects	'J' positive results, 'UJ' non detects	'J' positive results, "R" non detects

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRFs) or difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more.)

☐ ☒ ☐

14.0 Internal Standards (Form VIII)

14.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits for each continuing calibration?

☐ ☒ ☐

ACTION: List all the outliers below.

Sample #	Internal Std	Area	Lower Limit	Upper Limit
TILLET DUF	BCM	69100	81000	324000
TILLET DUF	DFB	237000	309000	1236000
TILLET DUF	CBZ	247000	261500	1046000
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

(Attach additional sheets if necessary.)

ACTION: If the internal standard area count is outside the upper or

YES NO N/A

lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard. If extremely low area counts are reported, or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable ("R").

14.2 Are the retention times of the internal standards within 30 seconds of the associated calibration standard?

[☒] — —

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

15.0 Field Duplicates

15.1 Were any field duplicates submitted for VOA analysis?

[☒] — —

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

YES NO N/A

Part B: BNA Analyses1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Forms present for all samples?

[] — ✓

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with the sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data?

— [] ✓

ACTION: Use professional judgement to evaluate the effect on the quality of the data.

ACTION: If any sample analyzed as a soil contains more than 50% water, all data should be flagged as estimated (J).

2.0 Holding Times

2.1 Have any BNA holding times, determined from date of collection to date of extraction, been exceeded?

— [] ✓

Samples for BNA analysis, both soils and waters, must be extracted within seven days of the date of collection. Extracts must be analyzed within 40 days of the date of extraction.

Table of Holding Time Violations

(See Traffic Report)

Sample	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted	Date Analyzed
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

	YES	NO	N/A
ACTION: If holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.			

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon reanalysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. The reviewer may determine that non-detect data are unusable ("R").

3.0 Surrogate Recovery (Form II)

3.1 Are the BNA Surrogate Recovery Summaries (Form II) present for each of the following matrices:

a. Low Water	☐	☐	☒
b. Med Water	☐	☐	☒
c. Low Soil	☐	☐	☒
d. Med Soil	☐	☐	☒

3.2 Are all the BNA samples listed on the appropriate Surrogate Recovery Summaries for each of the following matrices:

a. Low Water	☐	☐	☒
b. Med Water	☐	☐	☒
c. Low Soil	☐	☐	☒
d. Med Soil	☐	☐	☒

ACTION: Call lab for explanation/resubmittals. If missing deliverables are unavailable, document effect on data under "Conclusions" section of reviewer narrative.

3.3 Were outliers marked correctly with an asterisk?	☐	☐	☒
--	--------------------------	--------------------------	-------------------------------------

ACTION: Circle all outliers in red.

3.4 Were two or more base-neutral OR acid surrogate recoveries out of specification for any sample or method blank?

YES NO N/A

— [] ✓

— If yes, were samples re-analyzed? —

[] — ✓

Were method blanks re-analyzed?

[] — ✓

ACTION: If all BNA surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet SOW specifications, for the affected fraction only (i.e. base-neutral OR acid compounds):

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ").

If any base-neutral OR acid surrogate has a recovery of < 10%:

1. Flag all positive results for that fraction (i.e. all acid OR base-neutral compounds) "J".
2. Flag all non-detects for that fraction "R".

Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and re-analyses. Check the internal standard area.

3.5 Are there any transcription/calculation errors between raw data and Form II.

— [] ✓

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and note errors under "Conclusions".

4.0 Matrix Spikes (Form III)

4.1 Is the Matrix Spike Duplicate/Recovery Form (Form III) present?

[] — ✓

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

	YES	NO	N/A
a. Low Water	☐	☐	☒
b. Med Water	☐	☐	☒
c. Low Soil	☐	☐	☒
d. Med Soil	☐	☐	☒

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above.

4.3 How many BNA spike recoveries are outside QC limits?

Water

Soils

_____ out of 22 _____ out of 22

4.4 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water

Soils

_____ out of 11 _____ out of 11

ACTION: If MS and MSD both have less than 10% recovery for an analyte, negative results for that analyte should be rejected, and positive results should be flagged "J". The above applies only to the sample used for MS/MSD analysis. Use professional judgement in applying this criterion to other samples.

5.0 Blanks (Form IV)

5.1 Is the Method Blank Summary (Form IV) present?

☐ ☐ ☒

5.2 Frequency of Analysis: for the analysis of BNA TCL compounds, has a reagent/method blank been analyzed for each set of samples or every 20 samples of similar matrix (low water, med water, low soil, med soil), whichever is more frequent?

☐ ☐ ☒

5.3 Has a BNA instrument blank been analyzed for each GC/MS system used?

YES NO N/A
[] — ✓

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, reject all associated positive data ("R").

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for VOAs?

[] — ✓

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks" and "distilled water blanks" are validated like any other sample and not used to qualify data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results (TCL and/or TIC) for BNAs? When applied as described below, the contaminant concentration in these blanks is multiplied by the sample Dilution Factor.

— [] ✓

6.2 Do any field/rinse blanks have positive BNA results (TCL and/or TIC)?

— [] ✓

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: Only field/rinse blanks taken the same day as the samples are used to qualify data. Blanks may not be qualified because of contamination in another blank. Blanks may be qualified for surrogate, spectral, tuning or calibration QC problems.

YES NO N/A

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks.

	Sample conc > CRQL but < 10x blank	Sample conc < CRQL & is < 10x blank value	Sample conc > CRQL value & > 10x blank value
Common Phthalate Esters	Flag sample result with a 'U'; cross out 'B' flag	Reject sample result and report CRQL; cross out 'B' flag	No qualification is needed
	Sample conc > CRQL but < 5x blank	Sample conc < CRQL & is < 5 x blank value	Sample conc > CRQL value & > 5 blank value
Other Contaminants	Flag sample result with a 'U'; cross out 'B' flag	Reject sample result and report CRQL; cross out 'B' flag	No qualification is needed

ACTION: For TIC compounds, if the concentration in the sample is less than five times the concentration in the most contaminated associated blank, flag the sample data "R" (unusable).

6.3 Are there field/rinse/equipment blanks associated with every sample? ☐ ☐ ☒

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank.
Exception: samples taken from a drinking water tap not have associated field blanks.

7.0 GC/MS Tuning and Mass Calibration (Form V)

7.1 Are the GC/MS Tuning and Mass Calibration Forms (Form V) present for Decafluorotriphenylphosphine (DFTPP)? ☐ ☐ ☒

7.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? ☐ ☐ ☒

7.3 Has a tuning performance compound been analyzed for every twelve hours of sample analysis per instrument? ☐ ☐ ☒

YES NO N/A

ACTION: If any tuning data are missing, take action specified in 3.2 above.

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBER

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

7.4 Have the ion abundance criteria been met for each instrument used? ☐ ☐ ☒

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If tuning calibration is in error, flag all associated sample data as unusable ("R"). However, if expanded ion criteria are met (See 1988 Functional Guidelines), the data review may accept data with appropriate qualifiers.

7.5 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more values.) ☐ ☐ ☒

7.6 Have the appropriate number of significant figures (two) been reported? (Check at least two values, but if errors are found, check more values.) ☐ ☐ ☒

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and note errors under "Conclusions".

7.7 Are the spectra of the mass calibration compound acceptable? ☐ ☐ ☒

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

8.0 Target Compound List (TCL) Analytes

8.1 Are the Organic Analysis Data Sheets (Form I BNA) present with required header information on each page, for each of the following:

a. Samples and/or fractions

[] — ✓

b. Matrix spikes and matrix spike duplicates

[] — ✓

c. Blanks

[] — ✓

8.2 Are the BNA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate

[] — ✓

b. Matrix spikes and matrix spike duplicates
(Mass spectra not required)

[] — ✓

c. Blanks

[] — ✓

ACTION: If any data are missing, take action specified in 3.2 above.

8.3 Are the response factors shown in the Quant Report?

[] — ✓

8.4 Is chromatographic performance acceptable with respect to:

Baseline stability

[] — ✓

Resolution

[] — ✓

Peak shape

[] — ✓

Full-scale graph (attenuation)

[] — ✓

Other: _____

[] — ✓

ACTION: Use professional judgement to determine the acceptability of the data.

- | | YES | NO | N/A |
|---|--------------------------|--------------------------|-------------------------------------|
| 8.5 Are the lab-generated standard mass spectra of the identified BNA compounds present for each sample? | ☐ | ☐ | ☒ |
| 8.6 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? | ☐ | ☐ | ☒ |
| 8.7 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum? | ☐ | ☐ | ☒ |
| 8.8 Do sample and standard relative ion intensities agree within 20%? | ☐ | ☐ | ☒ |

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected, flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected (at the calculated detection limit).

9.0 Tentatively Identified Compounds (TIC)

- | | | | |
|--|--------------------------|--------------------------|-------------------------------------|
| 9.1 Are all Tentatively Identified Compound Forms (Form I, Part B) present; and do listed TICs include scan number or retention time, estimated concentration and "J" qualifier? | ☐ | ☐ | ☒ |
| 9.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following: | | | |
| a. Samples and/or fractions as appropriate | ☐ | ☐ | ☒ |
| b. Blanks | ☐ | ☐ | ☒ |

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "J" qualifier if missing and "N" qualifier to all identified TIC compounds on Form I, Part B.

- | | | | |
|---|--------------------------|--------------------------|-------------------------------------|
| 9.3 Are any TCL compounds (from any fraction) listed as TIC compounds (example: 1,2-dimethylbenzene is xylene -- a VOA TCL -- and should not be reported as a TIC)? | ☐ | ☐ | ☒ |
|---|--------------------------|--------------------------|-------------------------------------|

ACTION: Flag with "R" any TCL compound listed as a TIC.

9.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% also present in the sample mass spectrum?

YES NO N/A

☐ ☐ ☒

9.5 Do TIC and "best match" standard relative ion intensities agree within 20%?

☐ ☐ ☒

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate.

10.0 Compound Quantitation and Reported Detection Limits

10.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found?

☐ ☐ ☒

10.2 Are the CRQLs adjusted to reflect dilutions and, for soils, sample moisture?

☐ ☐ ☒

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors under "Conclusions".

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQL data from the diluted sample analysis). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" value on the original Form I and substituting it with data from the analysis of diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's that should not be used, including any in the summary package.

	YES	NO	N/A
11.0 <u>Standards Data (GC/MS)</u>			
11.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant. Reports) present for initial and continuing calibration?	☐	☐	☒
12.0 <u>GC/MS Initial Calibration (Form VI)</u>			
12.1 Are the Initial Calibration Forms (Form VI) present and complete for the BNA fraction?	☐	☐	☒
ACTION: If any calibration standard forms are missing, take action specified in 3.2 above.			
12.2 Are response factors stable for BNAs over the concentration range of the calibration (RSD < 30%)?	☐	☐	☒
ACTION: Circle all outliers in red.			
ACTION: When RSD > 30%, non-detects may be qualified using professional judgement. Flag all positive results "J". When RSD > 90%, flag all non-detects as unusable ("R"). (Region II policy.)			
12.3 Do any compounds have a RRF < 0.05?	☐	☐	☒
ACTION: Circle all outliers in red.			
ACTION: If any BNA compound has an average RRF < 0.05, flag positive results for that compound as estimated ("J"), and flag non-detects for that compound as unusable ("R").			
12.4 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or %RSD? (Check at least two values but if errors are found, check more.)	☐	☐	☒
ACTION: Circle errors in red.			
ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors under "Conclusions".			

YES NO N/A

13.0 GC/MS Continuing Calibration (Form VII)

13.1 Are the Continuing Calibration Forms (Form VII) present and complete for the BNA fraction?

[] — ✓

13.2 Has a continuing calibration standard been analyzed for every twelve hours of sample analysis per instrument?

[] — ✓

ACTION: List below all sample analyses that were not within twelve hours of the previous continuing calibration analysis.

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

13.3 Do any continuing calibration standard compounds have a RRF < 0.05?

— [] ✓

ACTION: Circle all outliers in red.

ACTION: If any BNA compound has a RRF < 0.05, flag positive results for that compound as estimated ("J"), and flag non-detects for that compound as unusable ("R").

13.4 Do any compounds have a % difference between initial and continuing calibration RRF > 25%?

— [] ✓

ACTION: Circle all outliers in red and qualify associated sample data as outlined in the table below:

% DIFFERENCE

25-50	50-90	> 90
'J' positive results, no action for non detects	'J' positive results, 'UJ' non detects	'J' positive results, "R" non detects

YES NO N/A

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or difference (%D) between initial and continuing RRFs? (check at least two values but if errors are found, check more.)

— [] ✓

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors under "Conclusions".

14.0 Internal Standards (Form VIII)

14.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits for each continuing calibration?

[] — ✓

ACTION: List all the outliers below.

Sample #	Internal Std	Area	Lower Limit	Upper Limit
—	—	—	—	—
—	—	—	—	—
—	—	—	—	—
—	—	—	—	—
—	—	—	—	—

(Attach additional sheets if necessary.)

ACTION: If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard. If extremely low area counts are reported, or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable ("R").

14.2 Are the retention times of the internal standards within 30 seconds of the associated calibration standard?

[] — ✓

YES NO N/A

ACTION: Professional judgement should be used to qualify data retention times differ by more than 30 seconds.

15.0 Field Duplicates

15.1 Were any field duplicates submitted for BNA analysis?

[] — ✓

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

YES NO N/A

PART C: PESTICIDE/PCB ANALYSES1.0 Traffic Reports and laboratory Narrative

- 1.1 Are the Traffic Report Forms present for all samples?
- ☐
- ☐
- ☒

ACTION: If no, contact lab for replace of missing or illegible copies.

- 1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data?
- ☐
- ☐
- ☒

ACTION: Use professional judgement to evaluate the effect on the quality of the data.

ACTION: If any sample analyzed as a soil contains more than 50% water, all data should be flagged as estimated (J).

2.0 Holding Times

- 2.1 Have any PEST/PCB holding times, determined from date of collection to date of extraction, been exceeded?
- ☐
- ☐
- ☒

Samples for PEST/PCB analysis, both soils and waters, must be extracted within seven days of the date of collection. Extracts must be analyzed within 40 days of the date of extraction.

3.0 Surrogate Recovery (Form II)

- 3.1 Are the PEST/PCB Surrogate Recovery Summaries (Form II) present for each of the following matrices:

a. Low Water ☐ ☐ ☒b. Med Water ☐ ☐ ☒c. Low Soil ☐ ☐ ☒d. Med Soil ☐ ☐ ☒

- 3.2 Are all the PEST/PCB samples listed on the appropriate Surrogate Recovery Summaries for each of the following matrices:

	YES	NO	N/A
a. Low Water	☐	☐	☒
b. Med Water	☐	☐	☒
c. Low Soil	☐	☐	☒
d. Med Soil	☐	☐	☒

ACTION: Call lab for explanation/resubmittals. If missing deliverables are unavailable, document effect on data under "Conclusions" section of reviewer narrative.

3.3 Were outliers marked correctly with an asterisk?

☐ ☐ ☒

ACTION: Circle all outliers in red.

3.4 Was surrogate (DBC) recovery outside of the contract specification for any sample or blank?

☐ ☐ ☒

ACTION: No qualification is done if surrogates are diluted beyond detection. If recovery is below contract limit (but above zero), flag all results for that sample "J". If recovery is zero, flag positive results "J" and non-detects "R". If recovery for the blank is zero, flag non-detects for all associated samples "R". If recovery is above contract limit, flag all positive results for that sample "J", unless in the reviewers professional judgement the high recovery is due to co-eluting interference (check the associated blank - if recovery is high there also, flag the sample data).

3.5 Are there any transcription/calculation errors between raw data and Form II?

☐ ☐ ☒

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and note errors under "Conclusions".

4.0 Matrix Spikes (Form III)

4.1 Is the Matrix Spike Duplicate/Recovery Form (Form III) present?

☐ ☐ ☒

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

	YES	NO	N/A
a. Low Water	☐	☐	☒
b. Med Water	☐	☐	☒
c. Low Soil	☐	☐	☒
d. Med Soil	☐	☐	☒

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above.

4.3 How many PEST/PCB spike recoveries are outside QC limits?

Water

Soils

_____ out of 12 _____ out of 12

4.4 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water

Soils

_____ out of 6 _____ out of 6

ACTION: If MS and MSD both have less than zero recovery for an analyte, negative results for that analyte should be rejected, and positive results should be flagged "J". The above applies only to the sample used for MS/MSD analysis. Use professional judgement in applying this criterion to other samples.

5.0 Blanks (Form IV)

5.1 Is the Method Blank Summary (Form IV) present?

☐ ☐ ☒

5.2 Frequency of Analysis: for the analysis of Pesticide TCL compounds, has a reagent/method blank been analyzed for each set of samples or every 20 samples of similar matrix (low water, med water, low soil, medium soil), whichever is more frequent?

☐ ☐ ☒

5.3 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for PEST/PCBs?

YES NO N/A
☐ ☐ ☒

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for PEST/PCBs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample Dilution Factor.

☐ ☐ ☒

6.2 Do any field/rinse blanks have positive PEST/PCB results?

☐ ☐ ☒

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: Only field/rinse blanks taken the same day as the samples are used to qualify data. Blanks may not be qualified for surrogate, spectral, tuning or calibration QC problems.

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks.

Sample conc > CRQL but < 5x blank	Sample conc < CRQL & is < 5x blank value	Sample conc > CRQL value & > 5x blank value
Flag sample result with a 'U'; cross out 'B' flag	Reject sample result and report CRQL; cross out 'B' flag	No qualification is needed

6.3 Are there field/rinse/equipment blanks associated with every sample?

YES NO N/A
☐ ☐ ☒

7.0 Calibration and GC Performance

7.1 Are the following Gas Chromatograms and Data System Printouts for both Primary and Confirmation (confirmation standards are not required if there are no positive results above CRQL) column present:

- a. Evaluation Standard Mix A
- b. Evaluation Standard Mix B
- c. Evaluation Standard Mix C
- d. Individual Standard Mix A
- e. Individual Standard Mix B
- f. Multi-component Pesticides Toxaphene & Chlordane
- g. Aroclors 1016/1260
- h. Aroclors 1221, 1232, 1242, 1248, 1254

☐ ☐ ☒

☐ ☐ ☒

☐ ☐ ☒

☐ ☐ ☒

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☐ ☐ ☒

☐ ☐ ☒

ACTION: If no, take action specified in 3.2 above.

7.2 Is Form VIII Pest-1 present and complete for each GC column (primary and confirmation) and each 72 hour sequence of analyses?

☐ ☐ ☒

ACTION: If no, take action specified in 3.2 above.

7.3 Are there any transcription/calculation errors between raw data and Form VIII?

☐ ☐ ☒

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and note errors under "Conclusions".

7.4 Has the total breakdown on quantitation or confirmation column exceeded 20% for DDT?

☐ ☐ ☒

- for Endrin?

☐ ☐ ☒

or if Endrin aldehyde and 4,4'-DDD co-elute and there is a peak at their retention time, has the combined DDT and Endrin breakdown exceeded 20%?

YES NO N/A

— [] ✓

ACTION:

- a. If DDT breakdown is greater than 20% on quantitation column beginning with the samples following the last in control standard:
 1. Flag all positive DDT results "J".
 2. If DDT was not detected but DDD and/or DDE are positive, flag the DDT non-detect "R".
 3. Flag positive DDD and DDE results "JN".
 4. If DDT breakdown is > 20% on confirmation column and DDT is identified on quantitation column but not on confirmation column, use professional judgement to determine whether DDT should be reported on Form I (if reported, flag result "N").
- b. If Endrin breakdown is > 20% on quantitation column, beginning with the samples following the last in control standard:
 1. Flag all positive Endrin results "J".
 2. If Endrin was not detected, but Endrin Aldehyde and/or Endrin Ketone are positive, flag the Endrin non-detect "R".
 3. Flag Endrin Ketone positive results "JN".
 4. If Endrin breakdown is > 20% on confirmation column and Endrin is identified on quantitation column but not on confirmation column, use professional judgement to determine whether Endrin should be reported on Form I (if reported, flag result "N").
- c. If the combined breakdown is used (it can only be used if the conditions in 7.4 above are met) and is > 20% on quantitation column beginning with the last in control standard, take the actions specified in 7.4 a and b above. If the combined breakdown is > 20% on confirmation column and Endrin or DDT is identified on quantitation column but not on confirmation column, use professional judgement to determine whether Endrin or DDT should be reported on Form I (if reported, flag result "N").

7.5 Is the linearity check RSD of all four calibration factors < 10% for the quantitation column?

[] — ✓

ACTION: If no, flag positive hits for all pesticide and PCB analytes "J" for all associated samples. Do not flag toxaphene or DDT if they are quantified from a 3-point calibration curve.

- | | YES | NO | N/A |
|---|--------------------------|--------------------------|-------------------------------------|
| 7.6 Is the % difference between EVAL A and each analysis (quantitation and confirmation) DBC retention time within QC limits (2% for packed column 0.3% for capillary [I.D. < 0.32 mm], 1% for megabore [0.32 < 2 mm])? | ☐ | ☐ | ☒ |

ACTION: DBC retention time cannot be evaluated if DBC is not detected. If it is present and has a retention time out of QC limits, then use professional judgement to determine the reliability of the analysis and flag results "R", if appropriate.

- | | | | |
|---|--------------------------|--------------------------|-------------------------------------|
| 7.7 Was the proper analytical sequence followed for each 72 hour period of analyses (page PEST D-36 in 8/87 SOW). | ☐ | ☐ | ☒ |
|---|--------------------------|--------------------------|-------------------------------------|

ACTION: If no, use professional judgement to determine the severity of the effect on the data and accept or reject accordingly. Generally, the effect is negligible unless the sequence was grossly altered or the calibration was also out of limits.

8.0 Pesticide/PCB Standards Summary

- | | | | |
|---|--------------------------|--------------------------|-------------------------------------|
| 8.1 Is Form IX present and complete for each GC column and 72 hr. sequence of analyses? | ☐ | ☐ | ☒ |
|---|--------------------------|--------------------------|-------------------------------------|

ACTION: If no, take action specified in 3.2 above.

- | | | | |
|--|--------------------------|--------------------------|-------------------------------------|
| 8.2 Are there any transcription/calculation errors between raw data and Form IX? | ☐ | ☐ | ☒ |
|--|--------------------------|--------------------------|-------------------------------------|

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and note errors under "Conclusions".

- | | | | |
|---|--------------------------|--------------------------|-------------------------------------|
| 8.3 Is DDT retention time for packed columns > 12 min (except OV-1 and OV-101 columns)? | ☐ | ☐ | ☒ |
|---|--------------------------|--------------------------|-------------------------------------|

ACTION: If no, check that there is adequate resolution between individual components. If not, flag results for compounds that interfere with each other (co-elute) "R".

- | | | | |
|---|--------------------------|--------------------------|-------------------------------------|
| 8.4 Do all standard retention times fall within the windows established for the first IND A and IND B analyses? | ☐ | ☐ | ☒ |
|---|--------------------------|--------------------------|-------------------------------------|

YES NO N/A

ACTION: Beginning with the samples following the last in control standard, check to see if the chromatograms contain peaks within an expanded window surrounding the expected retention times. If no peaks are found and DBC is visible non-detects are valid. If peaks are present and cannot be identified through "pattern recognition" or a consistent shift in standard retention times, flag all affected compound results "R".

- 8.5 Are the continuing calibration standard calibration factors within 15% (for confirmation column) of the initial (at beginning of 72 hr sequence) calibration factors? ☐ ☐ ☒

ACTION: If no, flag all associated positive results "J". Use professional judgement to determine whether or not to flag non-detects.

9.0 Pesticide/PCB Identification

- 9.1 Is Form X complete for every sample in which a pesticide or PCB was detected? ☐ ☐ ☒

ACTION: If no, take action specified in 3.2 above.

- 9.2 Are there any transcription errors between raw data and Form X? ☐ ☐ ☒

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and note errors under "Conclusions".

- 9.3 Are retention times of sample compounds within the calculated retention time windows for both quantitation and confirmation analyses? ☐ ☐ ☒

Was GC/MS confirmation provided when required (when compound concentration is > 10 ug/ml in final extract)? ☐ ☐ ☒

ACTION: Reject ("R") all positive results (meeting quantitation column criteria, but missing confirmation by a second column or GC/MS (if appropriate). Also, reject ("R") all positive results not meeting retention time window criteria unless associated standard compounds are similarly biased (i.e. base on RRT to DBC).

YES NO N/A

- 9.4 Check chromatograms for false negatives, especially for the multiple peak components toxaphene and PCB's. Were there any false negatives?

— ☐ ☒

ACTION: If appropriate PCB standards were not analyzed, or if the lab performed no confirmation analysis, flag the appropriate data with an "R".

10.0 Compound Quantitation and Reported Detection Limits

- 10.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Were any errors found?

— ☐ ☒

NOTE: Simple peak pesticide results can be checked for rough agreement between quantitative results obtained on the two GC columns. The reviewer should use professional judgement to decide whether a much larger concentration obtained on one column versus the other indicate the presence of an interfering compound. If an interfering compound is indicated, the lower of the two values should be reported and qualified as presumptively present at an estimated quantity ("JN"). This necessitates a determination of an estimated concentration on the confirmation column. The narrative should indicate that the presence of interferences has obscured the attempt at a second column confirmation.

- 10.2 Are the CRQLs adjusted to reflect sample dilutions and, for soils, sample moisture?

— ☐ ☒

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors under "Conclusions".

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQL data from the diluted sample analysis). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" value on the original Form I and substituting it with data from the analysis of diluted

YES NO N/A

sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's that should not be used, including any in the summary package.

11.0 Chromatogram Quality

11.1 Were baselines stable?

[] — ✓

11.2 Were any electropositive displacement (negative peaks) or unusual peaks seen?

— [] ✓

11.3 Were early eluting peaks (for early eluting analytes) resolved to baseline?

[] — ✓

ACTION: For 11.1 and 11.2, comment only. For 11.3, reject ("R") those analytes that are not sufficiently resolved.

12.0 Field Duplicates

12.1 Were any field duplicates submitted for PEST/PCB analysis?

[] — ✓

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

TOTAL REVIEW

CLP DATA ASSESSMENT

Functional Guidelines for Evaluating Organics Analysis

Case No. 910299 SDG No. Eglin-I LABORATORY Ceimic SITE Tutu Wells

DATA ASSESSMENT:

The current functional guidelines (USEPA February 1988) for evaluating organic data have been applied.

All data are valid and acceptable except those analytes which have been qualified with a "J" (estimated), "U" (undetected), "R" (unusable), or "JN" (presumptive evidence for the presence of the material at an estimated value). All action is detailed on the attached sheets.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable and rejected. In other words, due to significant QC problems the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains some error.

Reviewer's

Signature: 

Date: 9/4/1991
CD

Verified by: 

Date: 9/4/1991
LG

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded are qualified as estimated (J). The non-detects (sample quantitation limits) are qualified as estimated (J), unless the holding times are grossly exceeded (over one week beyond maximum holding time), in which case the associated data are unusable and rejected (R).

The following action was taken in the samples and analytes shown due to excessive holding time:

For this sample delivery group (SDG), holding time criteria are strictly applied. In other words, if a given sample analysis has exceeded holding time for even a fraction of a day (i.e. by hours), data are qualified accordingly.

Samples Eglin III, Four Winds II, Hartman II, Harvey, LaPlace, Matthias, Smith, Steele, Tillett, and X-1, were all analyzed outside of the specified holding time for aromatic volatile organic compounds; therefore the associated sample data are qualified as estimated (J) or estimated at the reporting limit (UJ). The dilutions (designated by DUP suffix) of samples DI Water (required because of water source contamination), Eglin I, Eglin III, Four Winds II, Harvey, LaPlace, Steele, and Tillett were analyzed outside of the specified holding time for the analysis of those compounds which exceeded the linear range of the low level analyses. Therefore, all of the associated data are qualified as estimated (J). A holding time non-compliance summary for this SDG is provided in Table 5.

2. BLANK CONTAMINATION

Quality assurance (QA) blanks, i.e., method, trip field, rinse and water blanks are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Trip blanks measure cross-contamination of samples during shipment. Field blanks measure cross-contamination of samples during field operations. If the concentration of the analyte is less than five times the blank contaminant level (ten times for the common contaminants), the analytes are negated and qualified as undetected, "U". The following analytes in the samples shown were qualified with "U" for these reasons:

A summary of all contaminated blanks and associated samples is provided in Table 4.

A) Method blank contamination

All of the method blanks associated with the volatile organic analyses of sample delivery group (SDG) Eglin-I were reviewed to determine laboratory contamination of the samples. Method blanks VBLK01, VBLK02, VBLK03, VBLK04, and VBLK05 were used in the low level (Method 524.2) analyses of samples associated with this SDG. In the analysis of volatile organics using the contract laboratory protocol (CLP) routine analytical services (RAS) methodology for those samples exceeding the linear range of Method 524.2, volatile method blanks VBLK06, VBLK07, and VBLK08 were reviewed to assess laboratory contamination levels.

Method blank VBLK01 is reported to contain 1 ug/L of methylene chloride. Samples Eglin I, Eglin II, Eglin III, Four Winds II, Ramsay, Steele, and Trip Blank6-5 are associated with this blank. Methylene chloride was undetected in all of the associated samples other than Trip Blank6-5. All of the associated non-detect data do not require qualification. Trip Blank6-5 is reported to contain less than ten times (< 10X) the amount of methylene chloride detected in the method blank; therefore, this result is negated and qualified "U".

Method blank VBLK02 is reported to contain 2 ug/L of methylene chloride and 1 ug/L of an unknown tentatively identified compound (TIC) with a retention time (RT) of 15.47 minutes. Samples Gassett, Hartman II, and Hartman III are associated with this method blank. Both of these compounds were undetected in all of the associated samples; therefore these data do not require qualification.

Method blank VBLK03 is reported to contain 14 ug/L of methylene chloride. Samples Harvey and Tillett are associated with this blank. Sample Harvey is reported to contain < 10X the amount of methylene chloride that was detected in the blank; therefore this result is negated and qualified "U". The compound was undetected in sample Tillett, therefore this result does not require qualification.

Although method blanks VBLK06, VBLK07, and VBLK08 are reported to contain contamination, qualification based on this contamination will not affect any of the usable data in this SDG. In other words, only data for 1,2-dichloroethene (1,2-DCE), trichloroethene (TCE), and tetrachloroethene (PCE), were utilized from the sample dilutions; therefore, only the quality control (QC) that affects these particular compounds in the sample dilutions will be addressed in this validation.

- B) Field or rinse blank contamination ("water blanks" or "distilled water blanks" are validated like any other sample)

The deionized and distilled water used in the preparation of the field and equipment blanks was purchased by Soil Tech in Puerto Rico. A preliminary sample of the deionized/distilled water sent to Ceimic Corporation by Soil Tech was reported to contain trihalomethane contamination, presumably due to carry over from water treatment. This information was reported verbally by Ceimic; no written documentation was provided.

Although trihalomethane contamination was suspected in the deionized/distilled water, Soil Tech brought water from the same source for preparation of an equipment blank prior to sampling the Gassett well. In the field, a joint decision by Caroline Kwan (USEPA) and Thomas Danahy (Geraghty & Miller) allowed for the use of the distilled water since the trihalomethanes are not parameters of concern at the Tutu Wells site.

In the field, a sample of deionized/distilled water (labelled "Deionize Water" on the chain-of-custody form) was poured into a sample vial to prepare a field blank. No analysis of the DI water was performed independent of the field operations, therefore no DI Water "water blank" exists for SDG Eglin-I.

After the Teflon bailer, to be used to sample the Gassett well, was decontaminated, deionized/distilled water was rinsed through the sample bailer, collected, and designated the equipment blank (Equip. Blank on the chain-of-custody). In other words, the distilled water was the water source for the equipment blank; therefore the field blank DI Water is used to qualify the equipment blank.

The field blank DI Water is reported to contain the following compounds:

<u>Compound</u>	<u>Amount Detected (ug/L)</u>
Chloromethane	0.9 J
Methylene Chloride	1
Acetone	8
Chloroform	53
1,2-Dichloroethane	1
Bromodichloromethane	18
Dibromochloromethane	5

The equipment blank (Equipment Bla) and samples Gassett, Hartman II, Hartman III, and Harvey are associated with the field blank DI Water.

Trip Blank6-4 is used to qualify the associated sample data for chloromethane, acetone, and 1,2-dichloroethane (1,2-DCA) since it contains higher levels of these compounds than the field blank. For the same reason, method blanks VBLK02 and VBLK03 are used to qualify the associated sample data for methylene chloride. All of the data for the three trihalomethanes detected in the equipment blank are negated and qualified "U". The trihalomethanes were undetected in the other associated samples; therefore these data do not require qualification.

C) Trip blank contamination

The trip blanks for SDG Eglin-I were prepared by Ceimic Corporation and shipped to Soil Tech with other field sample vials.

Trip Blank6-4 is reported to contain the following compounds:

<u>Compound</u>	<u>Amount Detected (ug/L)</u>
Chloromethane	9
Methylene Chloride	0.8
Acetone	11
1,2-Dichloroethane	2
Toluene	2

The equipment blank and samples Gassett, Hartman II, Hartman III, and Harvey are associated with this trip blank. Method blanks VBLK02 and VBLK03 are used to qualify the associated sample data for methylene chloride since they contain higher levels of this compound than this trip blank. Chloromethane was undetected in all of the associated samples other than Hartman III; therefore these data do not require qualification. The result for chloromethane in sample Hartman III is negated and qualified "U". Acetone was undetected in samples Hartman II and Harvey; therefore these data do not require qualification. The results for acetone in samples Gassett and Hartman III are negated and qualified "U". 1,2-DCA was undetected in samples Gassett, Hartman II, and Harvey; therefore these data do not require qualification. The result for 1,2-DCA in sample Hartman III is negated and qualified "U". Finally, none of the associated sample data for toluene requires qualification since this compound was undetected in all of the associated samples.

TUT 002 2391

Trip Blank6-5 is reported to contain the following compounds:

<u>Compound</u>	<u>Amount Detected (ug/L)</u>
Chloromethane	2
Methylene Chloride	1
1,2-Dichloroethane	1
Unknown (RT=2.90)	1 J
1,1,2-Trichloro-1,2,2-trifluoromethane	1 J
Unknown (RT=15.45)	3 J

Samples Eglin I, Eglin II, Eglin III, Four Winds II, Ramsay, and Steele are associated with this trip blank. Sample data for methylene chloride were previously qualified using method blank VBLK01 since it contains methylene chloride contamination equivalent to that detected in this trip blank. Chloromethane, 1,2-DCA, and both of the unknown TICs were undetected in all of the associated samples; therefore these data do not require qualification. Similarly, 1,1,2-trichloro-1,2,2-trifluoromethane was undetected in all of the associated samples other than Steele; therefore these data also require no qualification. The result for 1,1,2-trichloro-1,2,2-trifluoromethane in sample Steele is negated and qualified "U".

Trip Blank6-7 is reported to contain the following compounds:

<u>Compound</u>	<u>Amount Detected (ug/L)</u>
Chloromethane	6
Methylene Chloride	0.9
Acetone	8
1,2-DCA	2
2-Hexanone	0.8 J
Toluene	2

Samples LaPlace, Matthias, Smith, and X-1 are associated with this trip blank. Chloromethane, 1,2-DCA, and 2-hexanone were undetected in all of the associated samples; therefore these data do not require qualification. Methylene chloride was undetected in samples Smith and X-1, therefore the associated sample data do not require qualification. The results for methylene chloride in samples LaPlace and Matthias are negated and qualified "U". Acetone was undetected in all of the associated samples other than Matthias; therefore these data do not require qualification. The result for acetone

in sample Matthias is negated and qualified "U". Lastly, toluene was undetected in samples Matthias and Smith, therefore these data require no qualification. The results for toluene in samples LaPlace and X-1 are negated and qualified "U".

D) Equipment blank contamination

The equipment blank, labelled "Equipment Bla" by the laboratory, is reported to contain the following compounds:

<u>Compound</u>	<u>Amount Detected (ug/L)</u>
Methylene Chloride	1
Acetone	7
Chloroform	43
1,2-DCE	1
Bromodichloromethane	14
Dibromochloromethane	4
Hexane (RT=6.53)	4.0 J
Unknown (RT=8.23)	3.0 J
Unknown (RT=19.02)	1.0 J

Only sample Gassett is associated with the equipment blank. The field blank DI Water is reported to contain the same or higher levels of all the compounds other than hexane and the unknown TICs listed above, therefore it is used to qualify the associated sample data for Gassett. Hexane and both unknown TICs were undetected in sample Gassett, thus the associated data do not require qualification.

3. MASS SPECTROMETER TUNING:

Tuning and performance criteria are established to ensure adequate mass resolution, proper compound identification, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances. The tuning standard for volatile organic compounds (VOCs) is bromofluorobenzene (BFB).

If the mass calibration is in error, all associated data will be classified as unusable, "R".

The mass calibrations associated with the volatile analyses of SDG Eglin-I have all met the acceptance criteria to ensure adequate mass resolution, proper compound identification and instrument response. Form Va, for the BFB GC/MS tune performed June 13, 1991

on instrument MS2, indicates that the mass to charge ratio (m/z) of 176/174 (101.0%) is outside QC limits ($95.0\% < m/z \text{ 176/174} < 101.0\%$). In reviewing the raw data, the actual m/z ratio was found to be 100.99% which is within the QC limits; therefore no data qualification is necessary. Also, some rounding errors occurred from the transcription of the raw data to the Form Vs, but they had no effect on the quality of the generated data.

4. CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an analytical sequence. The continuing calibration checks document that the instrument is giving satisfactory daily performance.

A) RESPONSE FACTOR:

The response factor measures the instrument's response to specific chemical compounds. The response factor for the Target Compound List (TCL) must be ≥ 0.05 (a ratio of areas) in both the initial and continuing calibrations. A value < 0.05 indicates a serious detection and quantitation problem (poor sensitivity). Analytes detected in the sample will be qualified as estimated, "J". All non-detects for that compound will be rejected ("R").

The initial calibration (CLP RAS methodology) performed June 10, 1991 on instrument MS5 has a response factor < 0.05 for 2-butanone (0.045). This deficiency has no effect on the usable data for this SDG.

The initial calibration (low level analysis) performed June 11, 1991 on instrument MS2 has response factors < 0.05 for acetone (0.02228) and 2-butanone (0.00411). All of the samples in this SDG are associated with these deficiencies. Acetone was undetected in all of the samples other than Eglin III, Gassett, Hartman III, Matthias, and Ramsay. Non-detect sample data for acetone are unusable and rejected (R), and positive sample data are qualified as estimated (J). 2-Butanone was undetected in all of the samples, therefore all of the associated sample data are unusable and rejected (R).

All of the response factors for the initial calibration (CLP RAS methodology) performed June 15, 1991 on instrument MS6 are within the QC limit.

Many of the continuing calibrations (for both levels of analysis) have response factors for acetone and/or 2-butanone outside of the QC limit. All of the affected sample data

have already been qualified due to initial calibration deficiencies; therefore the associated sample data do not require further qualification.

5. CALIBRATION:

A) PERCENT RELATIVE STANDARD DEVIATION AND PERCENT DIFFERENCE:

Percent relative standard deviation (%RSD) is calculated from the initial calibration and is used to indicate the stability of the specific compound response factor over increasing concentration. Percent difference (%D) compares the response factor of the continuing calibration check to the average response factor (RRF) from the initial calibration. Percent D is a measure of the instrument's daily performance. Percent RSD must be <30% and %D must be <25%. A value outside of these limits indicates potential detection and quantitation errors. For these reasons, all positive results are flagged as estimated, "J", and non-detects are flagged "UJ" (if %D or RSD > 50%). If there is a gross deviation (i.e. > 90%) of %RSD and %D, the non-detects may be rejected (R).

The above listed criteria were modified slightly to reflect the %D criteria permissible for analyses performed in accordance with Method 524.2. As per the low level method, the response factor in the continuing calibration must be within 30% of the mean value measured in the initial calibration. As such, no qualifications were made for compounds in the continuing calibration standards with %D of <30% which were used in quantitation of low level volatile analyses. All other criteria and subsequent qualifications remain unchanged with respect to %RSD and %D, including the 25%D criterion for the continuing calibration verification for samples analyzed by the CLP RAS methodology.

The initial calibration (CLP RAS methodology) performed June 10, 1991 on instrument MS5 had a %RSD > 30% for methylene chloride (39.9%). This deficiency has no effect on the usable data for this SDG.

The initial calibration (low level analysis) performed June 11, 1991 on instrument MS2 has a %RSD > 30% for 2-butanone (32.473%). All of the samples in this SDG are associated with this deficiency. All of the associated sample data are already rejected due to a response factor deficiency; therefore no further qualification is necessary.

All of the %RSDs for the initial calibration (CLP RAS methodology) performed June 15, 1991 on instrument MS6 are within the QC limit.

The continuing calibration (low level analysis) performed June 12, 1991 at 09:35 on instrument MS2 has %Ds > 30% for methylene chloride (53.29%) and 2-butanone

TUT 002 2395

(61.88%). Samples Eglin I, Eglin II, Eglin III, Ramsay, Steele, Trip Blank6-5, and Four Winds II are associated with these deficiencies. Methylene chloride was undetected in all of the associated samples other than Trip Blank6-5. All of the non-detect data for methylene chloride are qualified as estimated at the reporting limit (UJ). The result for methylene chloride in Trip Blank6-5 is qualified as estimated (J). All of the associated sample data for 2-butanone are already rejected (R) due to a response factor deficiency.

All of the %Ds for the continuing calibration (low level analysis) performed June 12, 1991 at 22:21 on instrument MS2 are within the QC limit.

The continuing calibration (low level analysis) performed June 13, 1991 on instrument MS2 has %Ds > 30% for acetone (48.09%) and 2-butanone (45.77%). Samples Smith and X-1 are associated with these deficiencies. All of the associated sample data for both of these compounds are already rejected (R) due to response factor deficiencies.

All of the %Ds for the continuing calibration (low level analysis) performed June 14, 1991 on instrument MS2 are within the QC limit.

The continuing calibration (low level analysis) performed June 17, 1991 on instrument MS2 has %Ds > 30% for 1,2-DCA (39.51%) and 1,1,1-trichloroethane (34.00%). Samples Harvey and Tillett are associated with this deficiency. Both of the compounds were undetected in both of the associated samples; therefore no data qualification is necessary.

The remainder of the continuing calibrations (CLP RAS methodology) have various %Ds outside of the QC limit, but none of these deficiencies affected the usable data for this SDG.

TUT 002 2396

6. SURROGATES:

All samples are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below.

As specified in Method 524.2, bromofluorobenzene (BFB) and 1,2-dichlorobenzene-d4 (DCB-d4) were used for the surrogate compound spike additions in all samples analyzed by the low level drinking water method. The surrogate compound BFB was added at a final concentration of 1 ug/L but the surrogate compound DCB-d4 was added at a final concentration of 2 ug/L. The mean accuracy, expressed as a percentage of the true value, should be 80-120% for most compounds and surrogates. Some analytes, particularly the early eluting gases and late eluting higher molecular weight compounds, are measured with less accuracy than other analytes. Using the suggested guideline of 80-120% accuracy, the percent recoveries (%Rs) are outside the recommended limits for the following samples and blanks:

<u>Sample</u>	<u>BFB (%R)</u>	<u>DCB-d4 (%R)</u>
Eglin I	57	58
Eglin II	75	-
Eglin III	76	76
Equipment Blank	73	-
Four Winds II	62	71
Gassett	77	77
Hartman II	-	75
Smith	78	76
Trip Blank6-5	76	-
X-1	78	76
VBLK01	76	79
VBLK02	77	78
VBLK04	74	77

No reanalyses were performed on any of the samples with surrogate recoveries outside of the QC limits. All of the data for the samples with one or more surrogate recoveries outside of the QC limits are qualified as estimated (J) or estimated at the reporting limit (UJ). Data for samples associated with method blanks having both surrogate recoveries

TUT 002 2397

outside of QC limits are not qualified unless one or more of the surrogate recoveries associated with that particular sample analysis are outside of the QC limits.

The %R for BFB in the analysis of method blank VBLK03 is actually within QC limits. The reported value of 16% on the summary form is actually 82% as documented by the raw data. The result was incorrectly transcribed from the raw data.

For the analysis of volatile organic compounds by CLP RAS methodology, all of the surrogate %Rs are within QC limits.

7. INTERNAL STANDARDS PERFORMANCE:

Internal standard (IS) performance criteria ensure that the GC/MS sensitivity and response are stable during every analytical run. The internal standard area count must not vary by more than a factor of two (-50% to +100%) from the associated continuing calibration standard. The retention time of the internal standard must not vary more than ± 30 seconds from the associated continuing calibration standard. If the area count is outside the (-50% to +100%) range of the associated standard, all of the positive results for compounds quantitated using that IS are qualified as estimated (J), and all non-detects as estimated at the reporting limit (UJ), or unusable and rejected (R), if there is a severe loss of sensitivity.

If an internal standard retention time varies by more than 30 seconds, the reviewer will use professional judgement to determine either partial or total rejection of the data for that sample fraction.

For the low level analyses, all of the internal standard area counts and retention times are within QC limits.

For the volatile organic analyses using CLP RAS methodology, all of the internal standard retention times are with QC limits. All three internal standard area counts for the analysis of the dilution of sample Tillett (Tillett_DUP) are outside of QC limits. Consequently, all of the sample data for Tillett quantitated using these internal standards (bromochloromethane, 1,4-difluorobenzene, and chlorobenzene) are qualified as estimated (J) or estimated at the reporting limit (UJ). This deficiency affects the usable data (i.e. 1,2-DCE, TCE, and PCE) for sample Tillett_DUP.

TUT 002 2398

8. COMPOUND IDENTIFICATION:

A) VOLATILE AND SEMI-VOLATILE FRACTIONS:

TCL compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and by comparison to the ion spectra obtained from known standards. For the results to be a positive hit, the sample peak must be within ± 0.06 RRT units of the standard compound and have an ion spectra which has a ratio of the primary and secondary m/e intensities within 20% of that in the standard compound. For the tentatively identified compounds (TICs), the ion spectra must match accurately. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

TCL compound identification by GC/MS was based on comparison of the analyte RRT and ion spectra to those obtained from known spectra. Positive hits were reviewed for all samples and the following discrepancies were noted in meeting the relative retention time (RRT) criteria of ± 0.06 .

RRT criteria were exceeded in the low level analysis (Method 524.2) for total 1,2-dichloroethene (1,2-DCE). Calibration for the total 1,2-DCE analyses (cis and trans isomers) was based on the trans isomer for both the Method 524.2 and CLP RAS analyses. Quantitation of the cis isomer, if present, was based on the trans isomer response. This is the standard calibration and quantitation practice for volatile analyses using the CLP RAS methodology because the cis and trans isomers are unresolvable. Although separation and quantitation of the isomers can be achieved by Method 524.2 analysis, for the purposes of this project, 1,2-DCE was to be quantitated and reported as the total of the two isomers. As such, the exceeded RRT, in the samples listed above, was potentially due to the presence of the cis-1,2-DCE isomer. Since the calibration standards did not include the cis isomer, sample results were calculated using the trans isomer response factor. Based on this, the positive 1,2-DCE data for samples Matthias and Ramsay are interpreted to be due to the presence of the cis isomer; therefore the sample data (tentatively identified by the Method 524.2 analyses) are qualified as estimated (J).

9. MATRIX SPIKE/MATRIX SPIKE DUPLICATE:

The matrix spike/matrix spike duplicate (MS/MSD) data are generated to determine the long-term precision and accuracy of the analytical method in various matrices. The MS/MSD may be used in conjunction with other QC criteria for some additional qualification of the data.

Sample Ramsay was used to determine whether the sample matrix contributed bias to the analytical results. The sample was spiked at a level of 10 ug/L for the following analytes: 1,1-dichloroethene, trichloroethene, benzene, toluene and chlorobenzene. All of relative percent differences between matrix spike and matrix spike duplicate percent recoveries (%Rs) are within CLP RAS contract limits. Three out of ten matrix spike %Rs are outside (above) CLP RAS contract limits indicating that the sample matrix may be contributing high bias to the analytical results. All of the samples in this SDG are associated with these deficiencies. Since the direction of the bias contradicts most other trends in the QC data, and because MS/MSD data are not used solely to qualify associated sample data, no sample data are qualified as a result of MS/MSD QC deficiencies.

10. OTHER QC DATA OUT OF SPECIFICATION:

- A) The chains of custody indicate that three out of four vials for sample Eglin I, three out of four vials for sample Eglin II, and two out of four vials for sample Ramsay contained air bubbles. Consequently, all of the volatile organic data for these samples are assumed to be biased low and are qualified as follows: All positive data are qualified as estimated (J) and all non-detect data are unusable and rejected (R).
- B) Method Detection Limit Study

The method detection limit (MDL) study associated with Method 524.2 was performed on March 22, 1991. The MDL determination was based on the analysis of nine replicates of reagent water fortified at a concentration of 1.0 ug/L with the TCL analytes. Also, in accordance with Method 524.2, isomers of xylene (ortho, meta, and para) and 1,2-dichloroethene (cis and trans) were quantitated and calculated individually whereas in the sample data package, these isomers were reported as totals.

The laboratory MDL was calculated as the product of the standard deviation of nine replicate analyses and the student's t value for the 99% confidence level with eight degrees of freedom ($t = 2.90$).

Section 10.3.3 of Method 524.2 states that for every analyte and surrogate the mean accuracy, expressed as a percentage of the true value, should be 80 - 120% and the RSD < 20%. In the MDL study performed in support of the June 1991 analyses for the Tutu Wells site, the following analytes did not meet the precision and accuracy criteria required prior to sample analyses:

<u>Analyte</u>	<u>Mean Accuracy (%)</u>	<u>%RSD</u>
Vinyl Chloride	63	--
Chloroethane	61	--
Methylene Chloride	659	31.2
Acetone	1000	24.8
Carbon Disulfide	379	--
1,1-DCE	70	--
1,1-DCA	68	--
trans-1,2-DCE	78	--
2-Butanone	432	42.4
1,1,1-TCA	72	--
Carbon Tetrachloride	72	--
Vinyl Acetate	447	--
cis-1,3-DCPE	148	--
1,1,2-TCA	--	22.0
Benzene	73	--
trans-1,3-DCPE	38	--
Bromoform	22	--
4-Methyl-2-Pentanone	621	27.7
2-Hexanone	714	29.2
m,p-xylenes	170	--

None of the data for this SDG is qualified due to the results of this MDL study.

C) Laboratory Fortified Blanks

As per the QC requirements in Method 524.2 and the project Sampling, Analysis and Monitoring Plan (SAMP), a laboratory fortified blank (LFB), to which known quantities of the target analytes are added, is required to be analyzed for every batch of low level samples processed using the method. In the analysis of well samples for the Tutu site, LFBs were prepared at a concentration of 1 ug/L with TCL analytes and processed prior to the analysis of field samples in accordance with the QC protocol. The LFBs were to be evaluated using equivalent procedural guidelines for the determination of accuracy as stated in the MDL assessment for initial demonstration of precision and accuracy. Furthermore, an assessment of laboratory capability as to achievement of MDL for every sample batch processed was to be derived from the LFB analysis. Based on these evaluations, the laboratory was to continue with sample analyses if all criteria were achieved, or alternatively, remedy deficiencies prior to sample analyses where QC was not within limits (as specified in Method 524.2 Section 10.3).

For the purposes of the Tutu Wells site volatile organic analyses, the QC criteria were modified to assess data quality for analyses performed by Method 524.2 in the following manner: Based on an EPA guidance (dated December 4, 1990) regarding additional quality assurance/quality control (QA/QC) requirements when Method 524.2 is used for aqueous sample analysis, the 80 - 120% criteria for the accuracy assessment of LFB was expanded to 50 - 150%. Based on this guidance and for purposes of validation, for any analyte for which the LFB recovery was < 50%, the associated sample data were rejected and qualified as unusable (R). For LFB analyte recoveries in the range of 50 - 79%, the associated sample data were qualified as estimated (J). Data qualifiers were not applied to any sample result for which the associated LFB analyte recovery was high (> 150%).

The LFB identified as VFBLK01 has %Rs outside of QC limits for the following compounds:

<u>Compound</u>	<u>Recovery</u>
Chloromethane	60%
Methylene Chloride	200%
Acetone	600%
2-Butanone	0%

Samples Eglin I, Eglin II, Eglin III, Ramsay, Steele, Four Winds II, and Trip Blank6-5 are associated with this blank. Associated sample data for chloromethane are qualified as estimated (J). Associated sample data for 2-butanone are already rejected due to a calibration response factor deficiency. Sample data for the other compounds do not require qualification.

TUT 002 2402

The LFB identified as VFBLK02 has %Rs outside of QC limits for the following compounds:

<u>Compound</u>	<u>Recovery</u>
Vinyl Chloride	70%
Methylene Chloride	200%
Acetone	300%
Carbon Disulfide	70%
1,1-DCE	70%
2-Butanone	0%
TCE	70%
Carbon Tetrachloride	70%
Toluene	70%

Samples Gassett, Hartman II, and Hartman III are associated with this blank. Associated sample data for vinyl chloride, carbon disulfide, 1,1-DCE, TCE, carbon tetrachloride, and toluene are qualified as estimated (J). Associated sample data for 2-butanone are already rejected due to a calibration response factor deficiency. Sample data for the other compounds do not require qualification.

The LFB identified as VFBLK03 has %Rs outside of QC limits for the following compounds:

<u>Compound</u>	<u>Recovery</u>
Methylene Chloride	400%
Acetone	600%
2-Butanone	0%
Carbon Tetrachloride	70%

Samples Harvey and Tillett are associated with this blank. Associated sample data for carbon tetrachloride are qualified as estimated (J). Associated sample data for 2-butanone are already rejected due to a calibration response factor deficiency. Sample data for the other compounds do not require qualification.

The LFB identified as VFBLK04 has %Rs outside of QC limits for the following compounds:

<u>Compound</u>	<u>Recovery</u>
Methylene Chloride	200%
2-Hexanone	200%

Samples DI Water, Equipment Bla, RamsayMS, RamsayMSD, Smith, and X-1 are associated with this blank. None of the associated sample data requires qualification.

The LFB identified as VFBLK05 has %Rs outside of QC limits for the following compounds:

<u>Compound</u>	<u>Recovery</u>
Chloromethane	70%
Bromomethane	70%
Vinyl Chloride	70%
Chloroethane	70%
Methylene Chloride	200%
Acetone	200%
Carbon Disulfide	70%
Carbon Tetrachloride	70%
Vinyl Acetate	40%
Bromoform	70%
4-Methyl-2-Pentanone	200%

Samples LaPlace, Matthias, Trip Blank6-4, and Trip Blank6-7 are associated with this blank. Associated sample data for chloromethane, bromomethane, vinyl chloride, chloroethane, carbon disulfide, carbon tetrachloride, and bromoform are qualified as estimated (J). Associated sample data for vinyl acetate are rejected (R). Sample data for the other compounds do not require qualification.

D) Field Duplicates

Sample X-1 is a blind field replicate of sample LaPlace. The relative percent differences (RPDs) between data from sample LaPlace and sample X-1 are < 20% (acceptable level of precision) for all compounds other than total 1,2-DCE (RPD=38.0%) and PCE (RPD=31.5%). Based on these results, the data for 1,2-DCE and PCE in both of the samples are qualified as estimated (J).

11. SYSTEM PERFORMANCE AND OVERALL ASSESSMENT:

It is appropriate for the data reviewer to make professional judgments and express concerns and comments on the validity of the overall data for a case. This is particularly appropriate when there are several QC criteria out of specification. The additive nature of QC factors out of specifications is difficult to assess in an objective manner. The reviewer has a responsibility to inform the user concerning data quality and data limitations to assist the user in avoiding inappropriate use of the data. Therefore, this review has presented all QC factors which may affect the quality of the data.

Overall, Ceimic Corporation has provided minimally adequate, valid data of acceptable completeness. A number of QC deficiencies have resulted in data that are for the most part usable, although extensively qualified. Sample data have not been rejected when estimated as a result of more than one QC deficiency.

All of the sample data for 2-butanone and most of the data for acetone are rejected due to poor instrument sensitivity (low response factors). Some sample data for vinyl acetate are rejected due to poor recovery from the associated laboratory fortified blank (LFB). Other non-detect sample data are rejected because certain sample vials contained air bubbles. Much of the sample data are qualified as estimated because the laboratory failed to analyze the samples within the required holding times for aromatic organic compounds and the sample dilutions within the required holding times for either aromatic compounds or 1,2-DCE, TCE, and PCE.

Some sample data for methylene chloride are negated since their presence is the result of laboratory contamination. The equipment blank results for trihalomethanes are negated since their presence is the result of water source contamination. Some sample data for acetone, methylene chloride, 1,2-dichloroethane, toluene, and the TIC 1,1,2-trichloro-1,2,2-trifluoromethane are negated since their presence is the result of trip blank contamination.

Some sample data for methylene chloride are qualified as estimated due to a large percent difference in the response factor for methylene chloride from the associated continuing calibration. All of the data for a number of the samples are qualified as estimated as a result of poor surrogate recoveries. The data for 1,2-DCE, TCE, and PCE from the dilution of sample Tillett are qualified as estimated because the associated internal standard area counts are low.

TUT 002 2405

Finally, much of the sample data for chloromethane, bromomethane, vinyl chloride, chloroethane, carbon disulfide, 1,1-DCE, TCE, carbon tetrachloride, bromoform, and toluene are qualified as estimated due to poor recoveries from the LFB analyses.

The March 1991 MDL study resulted in numerous compounds not meeting the preliminary accuracy requirements needed to establish the baseline MDL for the low level analysis. In reviewing the MDL accuracy measurements for the compounds exceeding the criteria, the recoveries for 1,1-DCE, trans-1,2-DCE, 1,1,1-trichloroethane, carbon tetrachloride, and benzene were within $\pm 10\%$ of the 80 - 120% recovery criteria. For the remaining compounds outside of criteria, high recoveries for methylene chloride and acetone may be attributed to background contamination which is not out of the ordinary in a laboratory environment. With respect to carbon disulfide and vinyl acetate, the MDL replicates showed consistently high recoveries with very little deviation. No explanations as to the higher recoveries have been obtained. The precision requirement between replicate measurements in the MDL study ($RSD < 20\%$) was met for most compounds. Based on these observations, the MDL study of March 1991 adequately establishes the laboratory's capability to analyze samples with the accuracy and precision needed for low level analyses.

12. CONTRACT PROBLEMS (NON-COMPLIANCE):

The laboratory fortified blanks did not meet all of the method criteria (and/or the suggested expanded criteria) as required. In accordance to the method, these specifications must be met, or deficiencies remedied, prior to sample analysis and were not.

In non-compliance with the quality control section of the Sampling, Analysis, and Monitoring Plan (SAMP), the laboratory added the surrogate compound 1,2-dichlorobenzene-d4 (DCB-d4) at a final concentration of 2 ug/L instead of the specified 1 ug/L.

The laboratory modified some sample identifiers (IDs) from those designated on the chain-of-custody form as follows:

<u>Date Sampled</u>	<u>Chain-of-Custody ID</u>	<u>Laboratory ID</u>
6/4/91	Deionize Water	DI Water
6/4/91	Equip. Blank	Equipment Bla
6/4/91	Trip Blank	Trip Blank6-4
6/5/91	Trip Blank	Trip Blank6-5
6/6/91	Trip Blank	Trip Blank6-7

13. This package contains re-extraction, re-analysis or dilution. Upon reviewing the QA results, the following Form I(s) are identified to be used:

Form Is for the low level analyses (original, undiluted samples) of volatile organic compounds are utilized for all sample data within the low level calibration range (0-40 ppb). Sample data (1,2-DCE, TCE, and PCE) from Form Is for CLP RAS analyses are utilized when results are outside of the low level calibration range.

For the low level analyses of PCE in samples Harvey and Smith, the Form Is indicate that this compound was either undetected or detected at a low concentration. In actuality, laboratory personnel turned the GC/MS filament off since there was such a large concentration of PCE as indicated on the Form Is for the analyses of the sample dilutions by CLP RAS methodology.

Some rounding of sample results occurred on the transcription of raw data from the quantification report to the Form Is.

Sample X-1 is a blind field replicate of sample LaPlace.