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**FOURTH SAMPLING REPORT
OCTOBER 1991
TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS**

January 1992

Prepared for

Tutu Environmental Investigation Committee
San Juan, Puerto Rico

Prepared by

Geraghty & Miller, Inc.
201 West Passaic Street
Rochelle Park, New Jersey 07662
(201) 909-0700

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January 16, 1992

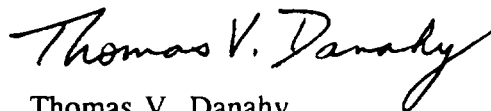
Geraghty & Miller, Inc. is submitting this report to the Tutu Environmental Investigation Committee for work performed at the Tutu Wells Site. The report was prepared in conformance with Geraghty & Miller's strict quality assurance/quality control procedures to ensure that the report meets the highest 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,

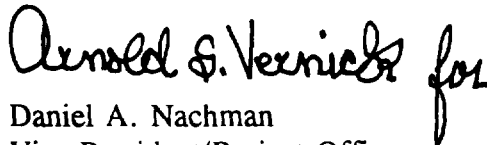
GERAGHTY & MILLER, INC.



Cameron S. Dunnan
Staff Scientist



Thomas V. Danahy
Senior Hydrogeologist/Project Manager



Daniel A. Nachman
Vice President/Project Officer

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INTRODUCTION

In April 1990, Geraghty & Miller, Inc. was retained by the Tutu Environmental Investigation Committee (TEIC) which is comprised of Texaco Caribbean Inc. (Texaco) and Esso U.S. Virgin Islands (Esso), to prepare a sampling, analysis, and monitoring plan (SAMP) for the Tutu Wells Site, St. Thomas, U.S. Virgin Islands. This fourth sampling report (October 1991) for the Tutu Wells Site 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 for Wells, Tutu Wells Site, St. Thomas, U.S. Virgin Islands," September 1990 (Geraghty & Miller, Inc. 1990). The SAMP was approved by the U.S. Environmental Protection Agency (USEPA) in its September 21, 1990 letter to the 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 conference calls. These conversations were documented in the second sampling report (Geraghty & Miller, Inc. 1991b).

Due to cumulative quality control (QC) problems caused by the previous laboratory, Geraghty & Miller recommended that Enseco East Incorporated (Enseco East) of Somerset, New Jersey be retained as the laboratory subcontractor after the third sampling event (Geraghty & Miller, Inc. 1991c). A meeting was held with the USEPA on July 15, 1991 to discuss the new laboratory and to clarify the sampling and analytical procedures. A revised SAMP (Geraghty & Miller, Inc. 1991d), which was submitted to the USEPA in September 1991 incorporates the clarifications of the sampling and analytical procedures and reflects the change in the analytical laboratory. The revised SAMP (Geraghty & Miller, Inc. 1991d) became effective prior to the fourth sampling event in October 1991.

The objectives of the SAMP (Geraghty & Miller, Inc. 1990) and the revised SAMP (Geraghty & Miller, Inc. 1991d) 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 fourth sampling event was conducted from October 1 through 3, 1991 by Soil Tech Corporation and Geraghty & Miller. 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 revised SAMP, with the exception of the few deviations outlined in the following section. Table 1 lists the wells and analytical parameters for the October 1991 sampling. 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. Enseco performed the laboratory analyses.

In 14 of the 15 wells sampled for the October 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 the well, the submersible pump was removed and the sample collected from the Gassett well was obtained using a Teflon bailer.

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The VOC parameters detected in the October 1991 samples are summarized in Table 2. The complete VOC validated data for the October 1991 sampling event are presented in Table 3. A few samples had minor spelling errors on the chain-of-custody and laboratory forms. For consistency, spelling errors were corrected upon receipt of laboratory data. Sample names shown on the tables that require explanation are as follows:

- The spelling of sample Tillet is incorrect. The proper spelling is Tillett. Refer to Figure 1 for proper spelling of all sample locations.
- The sample labelled " Hartman (crusher)" should have been labelled as Hartman II. The sample labelled "Hartman (estate)" should have been labelled Hartman III. Refer to Figure 1 for proper identification.
- A blind field replicate sample labelled "Ramos" was collected at the Tillett well. On the validated tables, sample "Ramos" was renamed "Tillett FR".
- A sample of distilled and deionized water supplied by Enseco was collected in the field and labelled "Water Blank" on the chain-of-custody form. The laboratory used the name "DI Water" for this sample.
- Matrix spike and matrix spike duplicate samples were collected from the Gassett well. These samples were identified as Gassett MS and Gassett MSD.
- The distilled deionized water provided by Enseco was used to prepare a field blank as described below. An equipment blank sample was collected by rinsing the distilled and deionized water through the clean Teflon bailer. The equipment blank was labelled "Field Blanks" on the chain-of-custody form. The laboratory used the name "Field Blank" for this sample.

- Prior to sampling the Gassett well, a Teflon bailer was decontaminated using the following procedures:

1. Non-phosphate detergent.
2. Tap water rinse.
3. Methanol.
4. Hexane.
5. Air dry.
6. Distilled and deionized water rinse.
7. Air dry.
8. Wrap in aluminum foil (shiny side out).

Trip blank samples were prepared by Enseco 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 (two 40-milliliter vials) was included in each container of samples shipped from the Tutu Wells Site to Enseco. Three coolers, each with a trip blank and other samples, were shipped via overnight delivery service.

Geraghty & Miller validated the analytical data in accordance with the USEPA Standard Operating Procedures (SOP) No. HW-6, March 1990, for organic compounds (USEPA 1990). The data validation summary is provided in Appendix A. The analytical results for the fourth sampling event (October 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 revised SAMP (Geraghty & Miller, Inc. 1991d).

PROCEDURAL DEVIATIONS

Deviations from the scope of work and procedures which occurred during the sampling event are outlined below.

1. 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 would equal approximately 360 gallons. However, due to logistical problems associated with containerizing the evacuated water, the Tillett well was pumped for 17 minutes and approximately 265 gallons were removed prior to sampling.
2. In accordance with the recommendations presented in the second sampling report (Geraghty & Miller, Inc. 1991b) and in the third sampling report (Geraghty & Miller, Inc. 1991c), which were subsequently approved by the USEPA, the list of wells for the fourth sampling event (October 1991) 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, their geographic location, and their hydrogeologic relationship with the area of elevated VOCs at the Tutu Wells Site. Table 1 lists the sampling locations and analytical parameters for the fourth sampling event.
3. The concentrations of VOCs in the blank samples are listed in Table 3 and a summary of blank samples is presented in Table 4. The detection of chloromethane and 1,2-dichloroethane in all three trip blanks at low levels indicates cross-contamination of these parameters. Because these two compounds were not detected in any site samples, the presence of these compounds in trip blank samples is not attributable to cross-contamination while at the site or during shippage from the site. These compounds are likely due to cross-contamination during laboratory preparation of the trip blank, shippage to the site, or laboratory analysis. The detection of acetone, methylene chloride, carbon disulfide, toluene and xylenes at low levels in trip blank sample indicates cross-contamination of these parameters. Low-level concentrations of toluene and methylene chloride were detected in the "water blank" sample. Acetone, methylene chloride and toluene are common laboratory artifacts. Although carbon disulfide and xylenes

are used in the laboratory environment, these compounds are not generally accepted as common laboratory artifacts. It is likely that all of the parameters detected in these blanks are the result of laboratory contamination. A complete discussion of the data validation qualifiers applied to these data is presented in Appendix A.

4. Due to laboratory contamination of blank samples, sample data were qualified for toluene, methylene chloride, carbon disulfide, methyl cyclopentone and xylenes. Table 4 provides a summary of the contamination in the trip blank samples. The complete data validation based upon blank contamination is discussed in Item 2 of Appendix A.
5. A Method Detection Limit (MDL) study was performed by Enseco on July 29, 1991 for TCL analytes. Five analytes (methylene chloride, 2-butanone, dibromochloromethane, trans-1, 3-dichloropropane, and bromoform) did not meet the accuracy criteria of between 80 to 120 percent mean accuracy. In accordance with data validation guidelines, no results were qualified based upon the MDL study.
6. Two laboratory fortified blanks (LFBs) had analyte recoveries outside the required QC guidelines for three parameters (trans-1,3-dichloropropene, dibromochloromethane, and bromoform). A third LFB had low recoveries for trans-1,3-dichloropropene and bromoform. Associated sample data were qualified as estimated (J) or estimated at the quantitation limit (UJ).
7. Sample dilutions were required to reanalyze within the linear range of calibration. Form I(s) provided by the laboratory for the dilutions did not report the correct dilution factor. The quantitation reports were used to verify the dilution factors.

8. Data for vinyl chloride, 1,2-dichloroethene (total), trichloroethene, benzene, tetrachloroethene, toluene, ethylbenzene, and xylenes (total) are estimated in two samples where the field replicate results varied more than 20 percent from the sample results.

RESULTS AND DISCUSSION

A summary of the volatile organic analytical results for the fourth quarter (October 1991) sampling event is provided in Table 2. The complete validated VOC data results are presented in Table 3. All VOC analyses were performed within the required holding time, as shown in Table 5. Table 6 presents a summary of detected VOC parameters for the first four sampling events (September 1990, February 1991, June 1991, and October 1991) and the complete validated VOC data results for these four events are presented in Table 7.

DATA QUALITY EXCEPTIONS

A discussion of the data validation findings is provided in Appendix A. Overall, Enseco has provided valid data of acceptable completeness. The QC deficiencies are minor and therefore, the data are usable, with minor qualifications. Sample data have not been rejected when qualified as estimated due to more than one deficiency.

Enseco notified Geraghty & Miller that LFB analyses for early eluting compounds (including trans-1,3-dichloropropene, dibromochloromethane, and bromoform) had low recoveries. Geraghty & Miller did not request remedial action because (1) these are not parameters of concern at the Tutu Wells Site and (2) low recovery of early eluting compounds often occurs.

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 tetrachloroethene (PCE), trichloroethene (TCE), and total 1,2-dichloroethene (1,2-DCE). With the exception of the Hartman III and Gassett samples, all three compounds were detected (ranging from 0.08 parts per billion [ppb] 1,2-DCE in Hartman III to 670 ppb PCE in Harvey) in all wells sampled including: samples Eglin I, Eglin II, Eglin III, Four Winds I, Four Winds II, Harvey, Hartman II, LaPlace, Matthias, Ramsay, Smith, Steele, and Tillett. Low-level concentrations (less than 1 ppb) were reported for PCE and 1,2-DCE in the sample from the Hartman III well (see Table 2). The only reported parameter in Gassett (see Table 2) was a low-level estimated concentration of TCE (0.11 ppb).

Other VOCs detected in samples from the site included vinyl chloride, methylene chloride, bromodichloromethane, carbon disulfide, chloroform, benzene, toluene, chlorobenzene, ethylbenzene, and xylenes (see Table 2). Reported values for methylene chloride in the LaPlace (4.6 ppb) and Matthias (1.9 ppb) samples are due to laboratory contamination. The presence of methylene chloride was detected in trip blank samples. Methylene chloride was not previously detected in either the LaPlace or Matthias samples. Carbon disulfide reported in the LaPlace sample (2.2 ppb) is also due to laboratory contamination because it was detected in three trip blank samples and the water blank sample (see Table 3). Carbon disulfide has never been previously reported in Tutu Well Site samples.

The October 1991 sampling results are consistent with the results of the three previous sampling events at the Tutu wells site (see Table 7). The distribution of 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, LaPlace, Smith, and Tillett samples have consistently contained the highest reported VOC concentrations. Of all parameters detected TCE, PCE, and 1,2-DCE have the

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

Vinyl chloride was reported in the area of the historically highest reported VOC concentration; including the Harvey (2.1 ppb), Steele (2.5 ppb), and Tillett (17 ppb) samples. Chloroform was reported in five well samples, typically at an estimated value less than 1 ppb. Bromodichloromethane was reported as an estimated value of 0.39 ppb in the Ramsay sample.

Petroleum compounds, such as benzene, toluene, ethylbenzene, and xylenes (BTEX) have not been detected in the majority of the wells sampled in the four sampling events. A slight increase in the number of samples with reported BTEX compounds occurred in the fourth sampling event. In the October 1991 sampling results, benzene was reported in five samples (Tillett, Four Winds I, Smith, Eglin III, and Steele) and one field replicate (Tillett FR). The reported BTEX compounds are distributed over two separate geographic areas.

In the first area, the highest BTEX values have been typically reported from the Tillett well samples (71 ppb of benzene in October 1991). The Four Winds I well was not sampled in September 1990, February 1991, and June 1991 due to an inoperable pump. Four Winds I was sampled in October 1991 with a reported estimated benzene value of 0.33 ppb.

In the second area of reported BTEX in ground-water, very low estimated concentrations (less than 0.2 ppb) of benzene and chlorobenzene were reported for the first time in three samples collected near and downgradient of the automobile repair shop located near the Eglin wells. These reported estimated values (October 1991) included the Eglin III (0.05 ppb benzene), Smith (0.1 ppb benzene), and Steele samples (0.08 ppb benzene and 0.13 chlorobenzene). During the second sampling event (February 1991), an estimated total xylenes value of 1 ppb was reported in Eglin I (see Table 7).

RECOMMENDATIONS

The October 1991 sampling results meet the prescribed objectives of the revised SAMP (Geraghty & Miller, Inc. 1991d). Geraghty & Miller recommends that the revised SAMP (Geraghty & Miller, Inc. 1991d) continue to be followed, but that the revisions discussed below be implemented.

- The fifth sampling event (scheduled to begin February 3, 1992) should include only the analytical parameters and locations discussed below and outlined in Table 8.
- The analytical parameters list from the first sampling event, with the exception of pesticides, should be implemented for the February 1992 sampling event. Pesticides should be eliminated because of previous non-detected pesticide results and because pesticides are not parameters of concern at the Tutu Wells Site.
- The sample locations should be limited to the wells sampled in the October 1991 sampling event because previous sampling results indicate that nine wells (Bryan, Dede, Demitri, Dench, Devcon I, Devcon III, Leonard, Rodriguez, and VIHA-III) have demonstrated the absence of parameters of concern for the Tutu Wells Site.

The geographical and hydrogeologic reasons for removing these nine wells from further sampling efforts are as follows.

- They are all located outside of the central portion of the Tutu valley where VOC contamination has been documented.
- The Bryan well is located in the Donne valley, a completely separate drainage basin from the Tutu valley.

- The Dimitri and Leonard wells are located upgradient and to the west of the central portion of Tutu valley; VIHA III is similarly upgradient of this area of concern.
- The Rodriguez well is situated near the axis of a tributary drainage basin to the Tutu valley and hence receives significant contribution from this valley.
- Dede, Dench, Devcon I, and Devcon II are all located at least 0.5 mile to the southeast of the area of concern, in a portion of the Turpentine River basin that receives significantly more contribution from other areas than from the central Tutu valley.

The absence of the VOCs of concern in these nine wells during the first two sampling events (see Table 6) confirms the geographical and hydrogeologic reasons for removing them from future sampling (Geraghty & Miller, Inc. 1991b).

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- USEPA 1990. Standard Operating Procedure HW-6 for the Contract Laboratory Program, Organic Data Review. U.S. Environmental Protection Agency, Region II, March 1990.

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TABLES

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

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

VOCs Volatile organic compounds.

Analysis was 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 October 1991 at the Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample ID: Eglin I Date: 2-Oct-91	Eglin II 2-Oct-91	Eglin III 2-Oct-91	Four Winds I 2-Oct-91	Four Winds II 2-Oct-91	Gassett 1-Oct-91	Hartman II 1-Oct-91	Hartman III 1-Oct-91	Harvey 2-Oct-91	LaPlace 3-Oct-91	Matthias 3-Oct-91	Ramsay 1-Oct-91	Smith 3-Oct-91
1,2-Dichloroethene (total)	45	67	51	89 D	190	NA	3.1	0.08 J	38	170 D	19	2.8	56 D
Chloroform	0.1 J	0.12 J	0.11 J	0.28 J	NA	NA	NA	NA	0.15 J	0.6 J	0.12 J	1.1	0.35 J
Trichloroethene	7.5	18	12	9.8	25	0.11 J	0.77	NA	25	30	8.6	1.6	20
Tetrachloroethene	24	54	36	36	80	NA	4.7	0.83	670 D	100 D	81	19	250 D
1,1-Dichloroethane	NA	NA	0.05 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.06 J
Benzene	NA	NA	0.05 J	0.33 J	NA	NA	NA	NA	NA	NA	NA	NA	0.1 J
Vinyl chloride	NA	NA	NA	NA	NA	NA	NA	NA	2.1	NA	NA	NA	NA
Methylene chloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.6	1.9	NA	NA
Carbon disulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.2 J	NA	NA	NA
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.39 J	NA
1,1-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Xylenes (total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Analyte concentrations in micrograms per liter (parts per billion [ppb]).
Analyses were performed by Enseco-East of Somerset, New Jersey, using USEPA Method 524.2.

D Compound identified at a secondary dilution.
J Result is detected below the reporting limit or is an estimated concentration.
FR Sample ID suffix denotes field replicate of previous sample.
NA Not applicable.

Table 2. Summary of Detected Concentrations of Volatile Organic Compounds in Ground-Water Samples Collected in October 1991 at the Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample ID: Steele		Tillet	Tillet FR
	Date:	1-Oct-91	2-Oct-91	2-Oct-91
1,2-Dichloroethene (total)		150 D	150	140 D
Chloroform		NA	NA	NA
Trichloroethene		29	38	35
Tetrachloroethene		54 D	66	63 D
1,1-Dichloroethane		0.11 J	NA	NA
Benzene		0.08 J	71 J	58 DJ
Vinyl chloride		2.5	17 J	11 J
Methylene chloride		NA	NA	NA
Carbon disulfide		NA	NA	NA
Bromodichloromethane		NA	NA	NA
1,1-Dichloroethene		0.12 J	NA	NA
Chlorobenzene		0.13 J	NA	0.2 J
Toluene		NA	3 J	2.1 J
Ethylbenzene		NA	17	14
Xylenes (total)		NA	3.6 J	2.7 J

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

Analyses were performed by Enseco-East of Somerset, New Jersey, using USEPA Method 524.2.

D Compound identified at a secondary dilution.

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

FR Sample ID suffix denotes field replicate of previous sample.

NA Not applicable.

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

	Sample ID: Eglin I	Eglin II	Eglin III	Four Winds I	Four Winds II	Gassett	Hartman II	Hartman III	Harvey	LaPlace	Matthias	Ramsay	Smith
Analyte	Date: 2-Oct-91	2-Oct-91	2-Oct-91	2-Oct-91	2-Oct-91	1-Oct-91	1-Oct-91	1-Oct-91	2-Oct-91	3-Oct-91	3-Oct-91	1-Oct-91	3-Oct-91
Chloromethane	1.0 U	1.2 U	0.50 U	0.50 U	5.0 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 U	1.2 U	0.50 U	0.50 U
Bromomethane	1.0 U	1.2 U	0.50 U	0.50 U	5.0 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 U	1.2 U	0.50 U	0.50 U
Vinyl chloride	1.0 U	1.2 U	0.50 U	0.50 U	5.0 U	0.50 U	0.50 U	0.50 U	2.1	2.5 U	1.2 U	0.50 U	0.50 U
Chloroethane	1.0 U	1.2 U	0.50 U	0.50 U	5.0 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 U	1.2 U	0.50 U	0.50 U
Methylene chloride	1.1 U	1.8 U	0.50 U	0.50 U	5.0 U	0.50 U	0.50 U	0.50 U	0.50 U	4.6	1.9	0.50 U	0.50 U
Acetone	4.0 U	5.0 U	2.0 U	2.0 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	5.0 U	2.0 U	2.0 U
Carbon disulfide	1 U	5.0 U	2.0 U	2.0 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	2.2 J	5.0 U	2.0 U	2.0 U
1,1-Dichloroethene	1.0 U	1.2 U	0.50 U	0.50 U	5.0 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 U	1.2 U	0.50 U	0.50 U
1,1-Dichloroethane	1.0 U	1.2 U	0.05 J	0.50 U	5.0 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 U	1.2 U	0.50 U	0.06 J
1,2-Dichloroethene (total)	45	67	51	89 D	190	0.50 U	3.1	0.08 J	38	170 D	19	2.8	56 D
Chloroform	0.1 J	0.12 J	0.11 J	0.28 J	5.0 U	0.50 U	0.50 U	0.50 U	0.15 J	0.6 J	0.12 J	1.1	0.35 J
1,2-Dichloroethane	1.0 U	1.2 U	0.50 U	0.50 U	5.0 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 U	1.2 U	0.50 U	0.50 U
2-Butanone	4.0 U	5.0 U	2.0 U	2.0 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	5.0 U	2.0 U	2.0 U
1,1,1-Trichloroethane	1.0 U	1.2 U	0.50 U	0.50 U	5.0 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 U	1.2 U	0.50 U	0.50 U
Carbon tetrachloride	1.0 U	1.2 U	0.50 U	0.50 U	5.0 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 U	1.2 U	0.50 U	0.50 U
Vinyl acetate	4.0 U	5.0 U	NA	NA	20 U	2.0 U	2.0 U	2.0 U	NA	10 U	NA	2.0 U	NA
Bromodichloromethane	1.0 U	1.2 U	0.50 U	0.50 U	5.0 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 U	1.2 U	0.39 J	0.50 U
1,2-Dichloropropane	1.0 U	1.2 U	0.50 U	0.50 U	5.0 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 U	1.2 U	0.50 U	0.50 U
trans-1,3-Dichloropropene	1.0 UJ	1.2 UJ	0.50 UJ	0.50 UJ	5.0 UJ	0.50 UJ	0.50 UJ	0.50 UJ	0.50 UJ	2.5 UJ	1.2 UJ	0.50 UJ	0.50 UJ
Trichloroethene	7.5	18	12	9.8	25	0.11 J	0.77	0.50 U	25	30	8.6	1.6	20
Dibromochloromethane	1.0 U	1.2 U	0.50 UJ	0.50 UJ	5.0 U	0.50 U	0.50 U	0.50 U	0.50 UJ	2.5 U	1.2 U	0.50 U	0.50 UJ
1,1,2-Trichloroethane	1.0 U	1.2 U	0.50 U	0.50 U	5.0 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 U	1.2 U	0.50 U	0.50 U
Benzene	1.0 U	1.2 U	0.05 J	0.33 J	5.0 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 U	1.2 U	0.50 U	0.1 J
cis-1,3-Dichloropropene	1.0 U	1.2 U	0.50 U	0.50 U	5.0 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 U	1.2 U	0.50 U	0.50 U
Bromoform	1.0 UJ	1.2 UJ	0.50 UJ	0.50 UJ	5.0 UJ	0.50 UJ	0.50 UJ	0.50 UJ	0.50 UJ	2.5 UJ	1.2 UJ	0.50 UJ	0.50 UJ
4-Methyl-2-pentanone	4.0 U	5.0 U	2.0 U	2.0 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	5.0 U	2.0 U	2.0 U
2-Hexanone	4.0 U	5.0 U	2.0 U	2.0 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	5.0 U	2.0 U	2.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.2 U	0.50 U	0.50 U	5.0 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 U	1.2 U	0.50 U	0.50 U
Tetrachloroethene	24	54	36	36	80	0.50 U	4.7	0.83	670 D	100 D	81	19	250 D
Toluene	1.0 U	1.2 U	0.50 U	0.50 U	5.0 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 U	1.2 U	0.50 U	0.50 U
Chlorobenzene	1.0 U	1.2 U	0.50 U	0.50 U	5.0 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 U	1.2 U	0.50 U	0.50 U
Ethylbenzene	1.0 U	1.2 U	0.50 U	0.50 U	5.0 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 U	1.2 U	0.50 U	0.50 U
Styrene	1.0 U	1.2 U	0.50 U	0.50 U	5.0 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 U	1.2 U	0.50 U	0.50 U
Xylenes (total)	1.0 U	1.2 U	0.50 U	0.50 U	5.0 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 U	1.2 U	0.50 U	0.50 U

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

Analyses were performed by Enesco-East of Somerset, New Jersey, using USEPA Method 524.2.

D Compound identified at a secondary dilution.

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

U Compound analyzed for but not detected.

FR Sample ID suffix denotes field replicate of previous sample.

NA Not applicable.

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

Analyte	Sample ID: Steele Date:	Tillett 1-Oct-91	Tillett FR 2-Oct-91	Field Blank 2-Oct-91	Trip Blank 1-Oct-91	Trip Blank 2-Oct-91	Trip Blank 3-Oct-91	Water Blank 3-Oct-91
Chloromethane	0.50 U	2.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Bromomethane	0.50 U	2.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Vinyl chloride	2.5	17 J	11 J	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Chloroethane	0.50 U	2.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Methylene chloride	0.50 U	2.5 U	0.50 U	0.50 U	0.50 U	0.6	0.17 J	0.26 J
Acetone	2.0 U	10 U	2.0 U	2.0 U	2.0 U	3.2	2.0 U	2.0 U
Carbon disulfide	2.0 U	10 U	2.0 U	2.0 U	0.21 J	1.4 J	0.25 J	0.73 J
1,1-Dichloroethene	0.12 J	2.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,1-Dichloroethane	0.11 J	2.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloroethene (total)	150 D	150	140 D	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Chloroform	0.50 U	2.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloroethane	0.50 U	2.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
2-Butanone	2.0 U	10 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,1,1-Trichloroethane	0.50 U	2.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Carbon tetrachloride	0.50 U	2.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Vinyl acetate	2.0 U	NA	NA	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Bromodichloromethane	0.50 U	2.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloropropane	0.50 U	2.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
trans-1,3-Dichloropropene	0.50 UJ	2.5 UJ	0.50 UJ	0.50 UJ	0.50 UJ	0.50 UJ	0.50 UJ	0.50 UJ
Trichloroethene	29	38	35	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Dibromochloromethane	0.50 UJ	2.5 U	0.50 UJ	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2-Trichloroethane	0.50 U	2.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Benzene	0.08 J	71 J	58 DJ	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
cis-1,3-Dichloropropene	0.50 U	2.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Bromoform	0.50 UJ	2.5 UJ	0.50 UJ	0.50 UJ	0.50 UJ	0.50 UJ	0.50 UJ	0.50 UJ
4-Methyl-2-pentanone	2.0 U	10 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
2-Hexanone	2.0 U	10 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,1,2,2-Tetrachloroethane	0.50 U	2.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Tetrachloroethene	54 D	66	63 D	0.50 U	0.50 U	0.1 J	0.50 U	0.50 U
Toluene	0.50 U	3 J	2.1 J	0.50 U	0.1 J	0.50 U	0.50 U	0.05 J
Chlorobenzene	0.13 J	2.5 U	0.2 J	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Ethylbenzene	0.50 U	17	14	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Styrene	0.50 U	2.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Xylenes (total)	0.50 U	3.6 J	2.7 J	0.50 U	0.28 J	0.11 J	0.25 J	0.50 U

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

Analyses were performed by Ensco-East of Somerset, New Jersey, using USEPA Method 524.2.

D Compound identified at a secondary dilution.

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

U Compound analyzed for but not detected.

FR Sample ID suffix denotes field replicate of previous sample.

NA Not applicable.

TUT 002 2429

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

Type of Blank	Associated Sample(s)
<u>Method Blank</u>	
VBLK01 (10/4/91)	Steele, Steele DL, Smith, Harvey, Eglin III, Four Winds I, Tillett FR
VBLK02 (10/6/91)	Hartman II, Hartman III, Ramsay, Gassett, Field Blank, Trip Blank (10/1/91)
VBLK02 (10/5/91)	Smith DL, Matthias, LaPlace, Eglin III DL, Four Winds I DL, Harvey DL, Trip Blank (10/2/91), Eglin II, Eglin I
VBLK03 (10/6/91)	Four Winds II, Tillett, Tillett FR DL, Trip Blank (10/3/91), Water Blank
VBLK03 (10/8/91)	Trip Blank (10/1/91)RE, Field Blank (10/1/91)RE
<u>Field Blank</u>	
DI Water	Gassett
<u>Water Blank</u>	
DI Water	Field Blank (10/1/91), Gassett
<u>Trip Blank</u>	
Trip Blank (10/2/91)	Harvey, Eglin III, Eglin II, Eglin I, Four Winds I, Four Winds II, Tillett, Tillett FR
Trip Blank (10/1/91)	Hartman II, Hartman III, Steele, Ramsay, Gassett, Field Blank (10/1/91)
Trip Blank (10/3/91)	Water Blank (10/3/91), Smith, Matthias, LaPlace

FR Field replicate.
DI Water Deionized water.
DL Sample dilution.
RE Reanalyzed sample.

PR00801/HW-6/summary

TUT 002 2430

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

Sample ID (Form I)	Date Sampled	Date Analyzed	Days Holding Time Exceeded for	
			Aromatic VOCs	All Other VOCs
Eglin I	10/2/91	10/5/91	0	0
Eglin II	10/2/91	10/5/91	0	0
Eglin III *	10/2/91	10/4/91	0	0
Field Blank (10/1/91)	10/1/91	10/6/91	0	0
Four Winds I*	10/2/91	10/4/91	0	0
Four Winds II *	10/2/91	10/6/91	0	0
Gassett	10/1/91	10/6/91	0	0
Gassett MS	10/1/91	10/6/91	0	0
Gassett MSD	10/1/91	10/6/91	0	0
Hartman II	10/1/91	10/6/91	0	0
Hartman III	10/1/91	10/6/91	0	0

* Sample was not preserved.
 VOCs Volatile organic compounds.
 MS Matrix spike.
 MSD Matrix spike duplicate.
 FR Field replicate.

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

Sample ID (Form I)	Date Sampled	Date Analyzed	Days Holding Time Exceeded for:	
			Aromatic VOCs	All Other VOCs
Harvey	10/2/91	10/4/91	0	0
LaPlace	10/3/91	10/5/91	0	0
Matthias *	10/3/91	10/5/91	0	0
Ramsay	10/1/91	10/6/91	0	0
Smith *	10/3/91	10/5/91	0	0
Steele *	10/1/91	10/4/91	0	0
Tillett *	10/2/91	10/6/91	0	0
Tillett FR *	10/2/91	10/4/91	0	0
Trip Blank (10/1/91)	10/1/91	10/8/91	0	0
Trip Blank (10/2/91)	10/2/91	10/5/91	0	0
Trip Blank (10/3/91)	10/3/91	10/6/91	0	0
Water Blank 10/3/91)	10/3/91	10/6/91	0	0

* Sample was not preserved.
 VOCs Volatile organic compounds.
 MS Matrix spike.
 MSD Matrix spike duplicate.
 FR Field replicate.

Table 6. Summary of Detected Concentrations of Volatile Organic Compounds in Ground-Water Samples Collected from September 1990 to October 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 I 2-Oct-91	Eglin II 27-Sep-90	Eglin II 5-Feb-91	Eglin II 5-Jun-91	Eglin II 2-Oct-91	Eglin III 27-Sep-90	Eglin III 5-Feb-91	Eglin III 5-Feb-91 FR	Eglin III 5-Jun-91	Eglin III 2-Oct-91
1,2-Dichloroethene (total)		68 J	60 J	68 DJ	45	120 J	72 DJ	130 DJ	67	52 J	45 J	45 J	69 DJ	51
Trichloroethene		10 J	8	10 J	7.5	22 J	19	19 J	18	14	11	13	15 J	12
Tetrachloroethene		32 J	26	32 J	24	71 J	34 DJ	61 DJ	54	44 J	35	36	40 J	36
Xylenes (total)		NA	1 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane		NA	NA	1 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform		NA	NA	NA	0.1 J	NA	NA	NA	0.12 J	NA	NA	NA	NA	0.11 J
Acetone		NA	NA	NA	NA	NA	NA	NA	NA	22 J	NA	NA	NA	NA
1,1-Dichloroethane		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.05 J
Benzene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.05 J
Toluene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloromethane		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Hexanone		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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

Analyses were performed by Ceimic Corporation of Narragansett, Rhode Island, or Enseco-East of Somerset, New Jersey, using USEPA Method 524.2.

D Compound identified at a secondary dilution.

E Concentration exceeds calibration range.

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

FR Sample ID suffix denotes field replicate of previous sample.

NA Not applicable.

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

Analyte	Sample ID: Four Winds I Date: 2-Oct-91	Four Winds II 26-Sep-90	Four Winds II FR 26-Sep-90	Four Winds II 5-Feb-91	Four Winds II 5-Jun-91	Four Winds II 2-Oct-91	Gassett 5-Feb-91	Gassett 1-Oct-91	Hartman II 26-Sep-90	Hartman II 5-Feb-91	Hartman II 4-Jun-91	Hartman II 1-Oct-91	Hartman III 26-Sep-90
1,2-Dichloroethene (total)	89 D	75 J	61 J	230 D	130 DJ	190	NA	NA	5 J	5 J	6 J	3.1	2
Trichloroethene	9.8	6 J	4 J	21	12 J	25	1	0.11 J	1 J	2	1 J	0.77	NA
Tetrachloroethene	36	25 J	18 J	90 D	34 DJ	80	NA	NA	7 J	9	7 J	4.7	1 J
Xylenes (total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	0.28 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	0.33 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	NA	NA	NA	NA	NA	NA	44 D	NA	NA	NA	NA	NA	NA
Vinyl chloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Hexanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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

Analyses were performed by Ceimic Corporation of Narragansett, Rhode Island, or Enseco-East of Somerset, New Jersey, using USEPA Method 524.2.

D Compound identified at a secondary dilution.

E Concentration exceeds calibration range.

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

FR Sample ID suffix denotes field replicate of previous sample.

NA Not applicable.

TUT 002 2434

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

Analyte	Sample ID: Hartman III Date: 5-Feb-91	Hartman III 1-Oct-91	Harvey 26-Sep-90	Harvey 5-Feb-91	Harvey 4-Jun-91	Harvey 2-Oct-91	LaPlace 2-Oct-90	LaPlace 5-Feb-91	LaPlace FR 5-Feb-91	LaPlace 6-Jun-91	LaPlace FR 6-Jun-91	LaPlace 3-Oct-91	Matthias 1-Oct-90
1,2-Dichloroethene (total)	NA	0.08 J	NA	160	80 DJ	38	140 J	200 D	190 D	250 DEJ	170 DJ	170 D	22
Trichloroethene	NA	NA	NA	60 J	36 DJ	25	24 J	32	31	31 D	32 J	30	11
Tetrachloroethene	1	0.83	890 J	1500	530 DEJ	670 D	98 J	110 D	100 D	88 DJ	64 DJ	100 D	120 J
Xylenes (total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	5	NA	NA	NA
Chloroform	NA	NA	NA	NA	NA	0.15 J	NA	1	NA	2	0.8 J	0.6 J	NA
Acetone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride	NA	NA	NA	NA	3	2.1	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.6	NA
Carbon disulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.2 J	NA
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Hexanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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

Analyses were performed by Ceimic Corporation of Narragansett, Rhode Island, or Enseco-East of Somerset, New Jersey, using USEPA Method 524.2.

D Compound identified at a secondary dilution.

E Concentration exceeds calibration range.

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

FR Sample ID suffix denotes field replicate of previous sample.

NA Not applicable.

TUT
002
2435

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

	Sample ID: Matthias		Matthias	Matthias	Ramsay	Ramsay	Ramsay	Ramsay	Smith	Smith	Smith	Smith	Steele	Steele
Analyte	Date:	5-Feb-91	6-Jun-91	3-Oct-91	1-Oct-90	5-Feb-91	5-Jun-91	1-Oct-91	25-Sep-90	5-Feb-91	6-Jun-91	3-Oct-91	25-Sep-90	5-Feb-91
1,2-Dichloroethene (total)	21	36 J	19	NA	NA	1 J	2 J	2.8	58	42 J	62 D	56 D	120	44
Trichloroethene	7 J	12	8.6	NA	NA	1	NA	1.6	20	23	26	20	48	12
Tetrachloroethene	76	59 DJ	81	3 J	16	16	16	19	330 J	160 J	190 D	250 D	130 J	65
Xylenes (total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	NA	4	NA	NA	NA	NA	NA	NA	NA	5	NA	NA	NA	NA
Chloroform	NA	NA	0.12 J	NA	NA	NA	1 J	1.1	NA	NA	NA	0.35 J	NA	NA
Acetone	NA	NA	NA	NA	NA	NA	15 J	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.06 J	NA	NA
Benzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.1 J	NA	NA
Toluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	NA	NA	1.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA	0.39 J	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Hexanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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

Analyses were performed by Ceimic Corporation of Narragansett, Rhode Island, or Enseco-East of Somerset, New Jersey, using USEPA Method 524.2.

D Compound identified at a secondary dilution.

E Concentration exceeds calibration range.

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

FR Sample ID suffix denotes field replicate of previous sample.

NA Not applicable.

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

	Sample ID: Steele	Steele	Tillett	Tillett FR	Tillett	Tillett	Tillett	Tillett FR	Field Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	
Analyte	Date:	5-Jun-91	1-Oct-91	2-Oct-90	2-Oct-90	5-Feb-91	5-Jun-91	2-Oct-91	2-Oct-91	5-Feb-91	24-Sep-90	25-Sep-90	26-Sep-90	27-Sep-90
1,2-Dichloroethene (total)	180 DJ	150 D	280 J	270 J	200 D	400 DEJ	150	140 D	NA	NA	NA	NA	NA	
Trichloroethene	42 DJ	29	56 J	47 J	36	72 DJ	38	35	NA	NA	NA	NA	NA	
Tetrachloroethene	150 DJ	54 D	120 J	98 J	100 D	180 DJ	66	63 D	NA	NA	NA	NA	NA	
Xylenes (total)	NA	NA	NA	NA	NA	NA	3.6 J	2.7 J	NA	8	7	NA	NA	
1,1,2-Trichloroethane	NA	NA	NA	NA	NA	4	NA	NA	NA	NA	NA	NA	NA	
Chloroform	NA	NA	NA	NA	NA	0.9	NA	NA	NA	NA	NA	NA	NA	
Acetone	NA	NA	NA	NA	NA	NA	NA	NA	NA	12 J	42 J	4 J	NA	
1,1-Dichloroethane	NA	0.11 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Benzene	NA	0.08 J	32 J	26 J	27	3 J	71 J	58 DJ	NA	NA	NA	NA	NA	
Toluene	NA	NA	NA	NA	1	0.8 J	3 J	2.1 J	NA	NA	1 J	NA	NA	
Vinyl chloride	4	2.5	17 J	12 J	7	5	17 J	11 J	NA	NA	NA	NA	NA	
Methylene chloride	NA	NA	NA	NA	NA	NA	NA	NA	2	25 J	34 J	24 J	16 J	
Carbon disulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,1-Dichloroethene	NA	0.12 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Chlorobenzene	NA	0.13 J	NA	NA	NA	NA	NA	0.2 J	NA	NA	NA	NA	NA	
Ethylbenzene	NA	NA	NA	NA	1	NA	17	14	NA	NA	NA	NA	NA	
Chloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2-Dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
2-Hexanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	

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

Analyses were performed by Ceimic Corporation of Narragansett, Rhode Island, or Enseco-East of Somerset, New Jersey, using USEPA Method 524.2.

D Compound identified at a secondary dilution.

E Concentration exceeds calibration range.

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

FR Sample ID suffix denotes field replicate of previous sample.

NA Not applicable.

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

Analyte	Sample ID: Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Trip Blank	Water Blank
Date:	1-Oct-90	2-Oct-90	4-Jun-91	5-Jun-91	6-Jun-91	1-Oct-91	2-Oct-91	3-Oct-91	3-Oct-91	
1,2-Dichloroethene (total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	NA	NA	NA	NA	NA	NA	0.1 J	NA	NA	NA
Xylenes (total)	NA	NA	NA	NA	NA	0.28 J	0.11 J	0.25 J	NA	NA
1,1,2-Trichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	6 J	7 J	11 J	NA	8 J	NA	3.2	NA	NA	NA
1,1-Dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	NA	NA	2	NA	2	0.1 J	NA	NA	NA	0.05 J
Vinyl chloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	13 J	14 J	0.8 J	NA	0.9 J	NA	0.6	0.17 J	0.26 J	0.26 J
Carbon disulfide	NA	NA	NA	NA	NA	0.21 J	1.4 J	0.25 J	0.73 J	0.73 J
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloromethane	NA	NA	9 J	2 J	6 J	NA	NA	NA	NA	NA
1,2-Dichloroethane	NA	NA	2	1 J	2	NA	NA	NA	NA	NA
2-Hexanone	NA	NA	NA	NA	0.8 J	NA	NA	NA	NA	NA

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

Analyses were performed by Ceimic Corporation of Narragansett, Rhode Island, or Enseco-East of Somerset, New Jersey, using USEPA Method 524.2.

D Compound identified at a secondary dilution.

E Concentration exceeds calibration range.

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

FR Sample ID suffix denotes field replicate of previous sample.

NA Not applicable.

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002
2438

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

Analyte	Sample ID: Eglin I	Eglin I	Eglin I	Eglin I	Eglin II	Eglin II	Eglin II	Eglin II	Eglin III	Eglin III	Eglin III FR	Eglin III	Eglin III
Date:	2-Oct-90	5-Feb-91	5-Jun-91	2-Oct-91	27-Sep-90	5-Feb-91	5-Jun-91	2-Oct-91	27-Sep-90	5-Feb-91	5-Feb-91	5-Jun-91	2-Oct-91
Chloromethane	R	2 UJ	R	1.0 U	10 UJ	2 UJ	R	1.2 U	10 UJ	2 UJ	2 U	1 UJ	0.50 U
Bromomethane	R	R	R	1.0 U	10 UJ	R	R	1.2 U	10 UJ	R	2 UJ	1 UJ	0.50 U
Vinyl chloride	R	R	R	1.0 U	10 UJ	R	R	1.2 U	10 UJ	R	2 UJ	1 UJ	0.50 U
Chloroethane	R	R	R	1.0 U	10 UJ	R	R	1.2 U	10 UJ	R	2 UJ	1 UJ	0.50 U
Methylene chloride	R	1 U	R	1.1 U	5 UJ	1 U	R	1.8 U	10 UJ	1 U	1 U	0.5 UJ	0.50 U
Acetone	R	R	R	4.0 U	R	R	R	5.0 U	22 J	R	R	2 UJ	2.0 U
Carbon disulfide	R	1 UJ	R	1 U	5 UJ	1 UJ	R	5.0 U	5 UJ	1 UJ	1 UJ	0.5 UJ	2.0 U
1,1-Dichloroethene	R	1 U	R	1.0 U	5 UJ	1 U	R	1.2 U	5 UJ	1 U	1 U	0.5 UJ	0.50 U
1,1-Dichloroethane	R	1 U	R	1.0 U	5 UJ	1 U	R	1.2 U	5 U	1 U	1 U	0.5 UJ	0.05 J
1,2-Dichloroethene (total)	68 J	60 J	68 DJ	45	120 J	72 DJ	130 DJ	67	52 J	45 J	45 J	69 DJ	51
Chloroform	R	1 U	R	0.1 J	5 UJ	1 U	R	0.12 J	5 U	1 U	1 U	0.5 UJ	0.11 J
1,2-Dichloroethane	R	1 UJ	R	1.0 U	5 UJ	1 UJ	R	1.2 U	5 UJ	1 UJ	1 U	0.5 UJ	0.50 U
2-Butanone	R	R	R	4.0 U	R	R	R	5.0 U	R	R	R	R	2.0 U
1,1,1-Trichloroethane	R	1 UJ	R	1.0 U	5 UJ	1 UJ	R	1.2 U	5 U	1 UJ	1 U	0.5 UJ	0.50 U
Carbon tetrachloride	R	1 U	R	1.0 U	5 UJ	1 U	R	1.2 U	5 U	1 U	1 U	0.5 UJ	0.50 U
Vinyl acetate	R	2 UJ	R	4.0 U	10 UJ	2 UJ	R	5.0 U	10 UJ	2 UJ	2 UJ	1 UJ	NA
Bromodichloromethane	R	1 UJ	R	1.0 U	5 UJ	1 UJ	R	1.2 U	5 UJ	1 UJ	1 U	0.5 UJ	0.50 U
1,2-Dichloropropane	R	1 U	R	1.0 U	5 UJ	1 U	R	1.2 U	5 UJ	1 U	1 U	0.5 UJ	0.50 U
cis-1,3-Dichloropropene	R	1 U	R	1.0 U	5 UJ	1 U	R	1.2 U	5 UJ	1 U	1 U	0.5 UJ	0.50 U
Trichloroethene	10 J	8	10 J	7.5	22 J	19	19 J	18	14	11	13	15 J	12
Dibromochloromethane	R	1 UJ	R	1.0 U	5 UJ	1 UJ	R	1.2 U	5 UJ	1 UJ	1 U	0.5 UJ	0.50 UJ
1,1,2-Trichloroethane	R	1 U	1 J	1.0 U	5 UJ	1 U	R	1.2 U	5 UJ	1 U	1 U	0.5 UJ	0.50 U
Benzene	R	1 UJ	R	1.0 U	5 UJ	1 UJ	R	1.2 U	5 UJ	1 UJ	1 U	0.5 UJ	0.05 J
trans-1,3-Dichloropropene	R	R	R	1.0 UJ	5 UJ	R	R	1.2 UJ	5 UJ	R	R	0.5 UJ	0.50 UJ
Bromoform	R	R	R	1.0 UJ	5 UJ	R	R	1.2 UJ	5 UJ	R	1 U	0.5 UJ	0.50 UJ
4-Methyl-2-pentanone	R	2 UJ	R	4.0 U	10 UJ	2 UJ	R	5.0 U	10 UJ	2 UJ	2 UJ	1 UJ	2.0 U
2-Hexanone	R	2 UJ	R	4.0 U	R	2 UJ	R	5.0 U	R	2 UJ	2 UJ	1 UJ	2.0 U
Tetrachloroethene	32 J	26	32 J	24	71 J	34 DJ	61 DJ	54	44 J	35	36	40 J	36
1,1,2,2-Tetrachloroethane	R	R	R	1.0 U	5 UJ	R	R	1.2 U	5 UJ	R	1 U	0.5 UJ	0.50 U
Toluene	R	1 UJ	R	1.0 U	5 UJ	1 UJ	R	1.2 U	5 UJ	1 UJ	1 U	0.5 UJ	0.50 U
Chlorobenzene	R	1 U	R	1.0 U	5 UJ	1 U	R	1.2 U	5 UJ	1 U	1 U	0.5 UJ	0.50 U
Ethylbenzene	R	1 UJ	R	1.0 U	5 UJ	1 UJ	R	1.2 U	5 UJ	1 UJ	1 U	0.5 UJ	0.50 U
Styrene	R	1 UJ	R	1.0 U	5 UJ	1 UJ	R	1.2 U	5 UJ	1 UJ	1 UJ	0.5 UJ	0.50 U
Xylenes (total)	R	1 J	R	1.0 U	5 UJ	1 UJ	R	1.2 U	5 UJ	1 UJ	1 UJ	0.5 UJ	0.50 U

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

Analyses were performed by Ceimic Corporation of Narragansett, Rhode Island, or Ensco-East of Somerset, New Jersey, using USEPA Method 524.2.

D Compound identified at a secondary dilution.
 E Concentration exceeds calibration range.
 J Result is detected below the reporting limit or is an estimated concentration.
 U Compound analyzed for but not detected.
 R Result rejected.

FR Sample ID suffix denotes field replicate of previous sample.

NA Not applicable.

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

Analyte	Sample ID: Four Winds I Date: 2-Oct-91	Four Winds II 26-Sep-90	Four Winds II FR 26-Sep-90	Four Winds II 5-Feb-91	Four Winds II 5-Jun-91	Four Winds II 2-Oct-91	Gassett 5-Feb-91	Gassett 4-Jun-91	Gassett 1-Oct-91	Hartman II 26-Sep-90	Hartman II 5-Feb-91	Hartman II 4-Jun-91	Hartman II 1-Oct-91
Chloromethane	0.50 U	5 UJ	5 UJ	2 U	1 UJ	5.0 U	2 U	2 UJ	0.50 U	2 UJ	2 U	1 UJ	0.50 U
Bromomethane	0.50 U	5 UJ	5 UJ	2 UJ	1 UJ	5.0 U	2 U	1 UJ	0.50 U	2 U	2 U	1 UJ	0.50 U
Vinyl chloride	0.50 U	5 UJ	5 UJ	2 UJ	1 UJ	5.0 U	2 U	1 UJ	0.50 U	2 U	2 U	1 UJ	0.50 U
Chloroethane	0.50 U	5 UJ	5 UJ	2 UJ	1 UJ	5.0 U	R	1 UJ	0.50 U	2 UJ	2 U	1 UJ	0.50 U
Methylene chloride	0.50 U	14 UJ	10 UJ	1 U	0.5 UJ	5.0 U	1 U	2 UJ	0.50 U	1 UJ	1 U	0.5 UJ	0.50 U
Acetone	2.0 U	R	R	R	R	20 U	R	10 UJ	2.0 U	R	R	R	2.0 U
Carbon disulfide	2.0 U	2 UJ	2 UJ	1 UJ	0.5 UJ	20 U	1 UJ	0.5 UJ	2.0 U	1 UJ	1 UJ	0.5 UJ	2.0 U
1,1-Dichloroethene	0.50 U	2 UJ	2 UJ	1 U	0.5 UJ	5.0 U	1 U	0.5 UJ	0.50 U	1 UJ	1 U	0.5 UJ	0.50 U
1,1,1-Trichloroethane	0.50 U	2 UJ	2 UJ	1 U	0.5 UJ	5.0 U	1 U	0.5 UJ	0.50 U	1 UJ	1 U	0.5 UJ	0.50 U
1,2-Dichloroethene (total)	89 D	75 J	61 J	230 D	130 DJ	190	1 U	0.5 UJ	0.50 U	5 J	5 J	6 J	3.1
Chloroform	0.28 J	2 UJ	2 UJ	1 U	0.5 UJ	5.0 U	1 U	0.5 UJ	0.50 U	1 UJ	1 U	0.5 UJ	0.50 U
1,2-Dichloroethane	0.50 U	2 UJ	2 UJ	1 U	0.5 UJ	5.0 U	1 U	1 UJ	0.50 U	1 UJ	1 U	0.5 UJ	0.50 U
2-Butanone	2.0 U	R	R	R	R	20 U	R	R	2.0 U	R	R	R	2.0 U
1,1,1-Trichloroethane	0.50 U	2 UJ	2 UJ	1 U	0.5 UJ	5.0 U	1 U	0.5 UJ	0.50 U	1 UJ	1 U	0.5 UJ	0.50 U
Carbon tetrachloride	0.50 U	2 UJ	2 UJ	1 U	0.5 UJ	5.0 U	1 U	0.5 UJ	0.50 U	1 UJ	1 U	0.5 UJ	0.50 U
Vinyl acetate	NA	5 UJ	5 UJ	2 UJ	1 UJ	20 U	R	1 UJ	2.0 U	2 UJ	2 UJ	1 UJ	2.0 U
Bromodichloromethane	0.50 U	2 UJ	2 UJ	1 U	0.5 UJ	5.0 U	1 U	0.5 UJ	0.50 U	1 U	1 U	0.5 UJ	0.50 U
1,2-Dichloropropane	0.50 U	2 UJ	2 UJ	1 U	0.5 UJ	5.0 U	1 U	0.5 UJ	0.50 U	1 UJ	1 U	0.5 UJ	0.50 U
cis-1,3-Dichloropropene	0.50 U	2 UJ	2 UJ	1 U	0.5 UJ	5.0 U	R	0.5 UJ	0.50 U	1 UJ	R	0.5 UJ	0.50 U
Trichloroethene	9.8	6 J	4 J	21	12 J	25	1	0.5 UJ	0.11 J	1 J	2	1 J	0.77
Dibromochloromethane	0.50 UJ	2 UJ	2 UJ	1 U	0.5 UJ	5.0 U	1 U	0.5 UJ	0.50 U	1 UJ	1 U	0.5 UJ	0.50 U
1,1,2-Trichloroethane	0.50 U	2 UJ	2 UJ	1 U	0.5 UJ	5.0 U	1 U	0.5 UJ	0.50 U	1 UJ	1 U	0.5 UJ	0.50 U
Benzene	0.33 J	2 UJ	2 UJ	1 UJ	0.5 UJ	5.0 U	1 U	0.5 UJ	0.50 U	1 UJ	1 U	0.5 UJ	0.50 U
trans-1,3-Dichloropropene	0.50 UJ	2 UJ	2 UJ	R	0.5 UJ	5.0 UJ	1 U	0.5 UJ	0.50 UJ	1 UJ	1 U	0.5 UJ	0.50 UJ
Bromoform	0.50 UJ	2 UJ	2 UJ	1 U	0.5 UJ	5.0 UJ	1 U	0.5 UJ	0.50 UJ	1 UJ	1 U	0.5 UJ	0.50 UJ
4-Methyl-2-pentanone	2.0 U	5 UJ	5 UJ	2 UJ	1 UJ	20 U	2 UJ	1 UJ	2.0 U	2 UJ	2 UJ	1 UJ	2.0 U
2-Hexanone	2.0 U	R	R	2 UJ	1 UJ	20 U	2 UJ	1 UJ	2.0 U	R	2 UJ	1 UJ	2.0 U
Tetrachloroethene	36	25 J	18 J	90 D	34 DJ	80	1 U	0.5 UJ	0.50 U	7 J	9	7 J	4.7
1,1,2,2-Tetrachloroethane	0.50 U	2 UJ	2 UJ	1 U	0.5 UJ	5.0 U	1 U	0.5 UJ	0.50 U	1 UJ	1 U	0.5 UJ	0.50 U
Toluene	0.50 U	2 UJ	2 UJ	1 UJ	0.5 UJ	5.0 U	44 D	0.5 UJ	0.50 U	1 UJ	1 U	0.5 UJ	0.50 U
Chlorobenzene	0.50 U	2 UJ	2 UJ	1 UJ	0.5 UJ	5.0 U	1 U	0.5 UJ	0.50 U	1 UJ	1 U	0.5 UJ	0.50 U
Ethylbenzene	0.50 U	2 UJ	2 UJ	1 UJ	0.5 UJ	5.0 U	1 U	0.5 UJ	0.50 U	1 U	1 U	0.5 UJ	0.50 U
Styrene	0.50 U	2 UJ	2 UJ	1 UJ	0.5 UJ	5.0 U	1 U	0.5 UJ	0.50 U	1 U	1 U	0.5 UJ	0.50 U
Xylenes (total)	0.50 U	2 UJ	2 UJ	1 UJ	0.5 UJ	5.0 U	1 U	0.5 UJ	0.50 U	1 U	1 U	0.5 UJ	0.50 U

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

Analyses were performed by Ceimic Corporation of Narragansett, Rhode Island, or Enseco-East of Somerset, New Jersey, using USEPA Method 524.2.

D Compound identified at a secondary dilution.

E Concentration exceeds calibration range.

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

U Compound analyzed for but not detected.

R Result rejected.

FR Sample ID suffix denotes field replicate of previous sample.

NA Not applicable.

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

Analyte	Sample ID: Hartman III Date: 26-Sep-90	Hartman III 5-Feb-91	Hartman III 4-Jun-91	Hartman III 1-Oct-91	Harvey 26-Sep-90	Harvey 5-Feb-91	Harvey 4-Jun-91	Harvey 2-Oct-91	LaPlace 2-Oct-90	LaPlace 5-Feb-91	LaPlace FR 5-Feb-91	LaPlace 6-Jun-91	LaPlace FR 6-Jun-91
Chloromethane	2 UJ	2 U	1 U	0.50 U	100 U	200 U	1 U	0.50 U	R	2 U	2 U	1 UJ	1 UJ
Bromomethane	2 UJ	2 UJ	1 U	0.50 U	100 U	200 U	1 U	0.50 U	R	2 U	2 U	1 UJ	1 UJ
Vinyl chloride	2 UJ	2 UJ	1 UJ	0.50 U	100 UJ	200 U	3	2.1	R	2 U	2 U	1 UJ	1 UJ
Chloroethane	2 UJ	2 UJ	1 U	0.50 U	100 U	200 U	1 U	0.50 U	R	R	R	1 UJ	1 UJ
Methylene chloride	3 UJ	1 U	2 U	0.50 U	150 UJ	100 U	7 U	0.50 U	R	1 U	1 U	3 UJ	1 UJ
Acetone	R	R	8 UJ	2.0 U	R	200 U	R	2.0 U	R	R	R	R	R
Carbon disulfide	1 UJ	1 UJ	0.5 UJ	2.0 U	50 UJ	100 U	0.5 U	2.0 U	R	1 UJ	1 UJ	0.5 UJ	0.5 UJ
1,1-Dichloroethene	1 UJ	1 U	0.5 UJ	0.50 U	50 UJ	100 U	0.5 U	0.50 U	R	1 U	1 U	0.5 U	0.5 UJ
1,1-Dichloroethane	1 U	1 U	0.5 U	0.50 U	50 U	100 U	0.5 U	0.50 U	R	1 U	1 U	0.5 U	0.5 UJ
1,2-Dichloroethene (total)	2	1 U	0.5 U	0.08 J	50 UJ	160	80 DJ	38	140 J	200 D	190 D	250 DEJ	170 DJ
Chloroform	1 UJ	1 U	0.5 U	0.50 U	50 U	100 U	0.5 U	0.15 J	R	1	1 U	2	0.8 J
1,2-Dichloroethane	1 UJ	1 U	1 U	0.50 U	50 UJ	100 U	0.5 U	0.50 U	R	1 U	1 U	0.5 U	0.5 UJ
2-Butanone	R	R	R	2.0 U	R	200 U	R	2.0 U	R	R	R	R	R
1,1,1-Trichloroethane	1 UJ	1 U	0.5 UJ	0.50 U	50 U	100 U	0.5 U	0.50 U	R	1 U	1 U	0.5 U	0.5 UJ
Carbon tetrachloride	1 U	1 U	0.5 UJ	0.50 U	50 U	100 U	0.5 UJ	0.50 U	R	1 U	1 U	0.5 UJ	0.5 UJ
Vinyl acetate	2 UJ	2 UJ	1 U	2.0 U	100 UJ	200 U	1 U	NA	R	R	R	R	1 UJ
Bromodichloromethane	1 U	1 U	0.5 U	0.50 U	50 UJ	100 U	0.5 U	0.50 U	R	1 U	1 U	0.5 U	0.5 UJ
1,2-Dichloropropane	1 U	1 U	0.5 U	0.50 U	50 U	100 U	0.5 U	0.50 U	R	1 U	1 U	0.5 U	0.5 UJ
cis-1,3-Dichloropropene	1 UJ	1 U	0.5 U	0.50 U	50 UJ	100 U	0.5 U	0.50 U	R	R	R	0.5 U	0.5 UJ
Trichloroethene	1 U	1 U	0.5 UJ	0.50 U	50 U	60 J	36 DJ	25	24 J	32	31	31 D	32 J
Dibromochloromethane	1 U	1 U	0.5 U	0.50 U	50 U	100 U	0.5 U	0.50 UJ	R	1 U	1 U	0.5 U	0.5 UJ
1,1,2-Trichloroethane	1 U	1 U	0.5 U	0.50 U	50 U	100 U	0.5 U	0.50 U	R	1 U	1 U	5	0.5 UJ
Benzene	1 U	1 U	0.5 U	0.50 U	50 U	100 U	0.5 UJ	0.50 U	R	1 U	1 U	0.5 U	0.5 UJ
trans-1,3-Dichloropropene	1 UJ	R	0.5 U	0.50 UJ	50 U	100 U	0.5 U	0.50 UJ	R	1 U	1 U	0.5 U	0.5 UJ
Bromoform	1 UJ	1 U	0.5 U	0.50 UJ	50 UJ	100 U	0.5 U	0.50 UJ	R	1 U	1 U	0.5 UJ	0.5 UJ
4-Methyl-2-pentanone	2 UJ	2 UJ	1 U	2.0 U	100 UJ	200 U	1 U	2.0 U	R	2 UJ	2 UJ	1 U	1 UJ
2-Hexanone	R	2 UJ	1 U	2.0 U	R	200 U	1 U	2.0 U	R	2 UJ	2 UJ	1 U	1 UJ
Tetrachloroethene	1 J	1	0.5 U	0.83	890 J	1500	530 DEJ	670 D	98 J	110 D	100 D	88 DJ	64 DJ
1,1,2,2-Tetrachloroethane	1 UJ	1 U	0.5 U	0.50 U	50 UJ	100 U	0.5 U	0.50 U	R	1 U	1 U	0.5 U	0.5 UJ
Toluene	1 U	1 U	0.5 UJ	0.50 U	50 U	100 U	0.5 UJ	0.50 U	R	1 U	1 U	4 UJ	3 UJ
Chlorobenzene	1 U	1 U	0.5 U	0.50 U	50 U	100 U	0.5 UJ	0.50 U	R	1 U	1 U	0.5 UJ	0.5 UJ
Ethylbenzene	1 U	1 U	0.5 U	0.50 U	50 U	100 U	0.5 UJ	0.50 U	R	1 U	1 U	0.5 UJ	0.5 UJ
Styrene	1 UJ	1 UJ	0.5 U	0.50 U	50 U	100 U	0.5 UJ	0.50 U	R	1 U	1 U	0.5 UJ	0.5 UJ
Xylenes (total)	1 UJ	1 UJ	0.5 U	0.50 U	50 UJ	100 U	0.5 UJ	0.50 U	R	1 U	1 U	0.5 UJ	0.5 UJ

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

Analyses were performed by Ceimic Corporation of Narragansett, Rhode Island, or Enseco-East of Somerset, New Jersey, using USEPA Method 524.2.

D Compound identified at a secondary dilution.

E Concentration exceeds calibration range.

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

U Compound analyzed for but not detected.

R Result rejected.

FR Sample ID suffix denotes field replicate of previous sample.

NA Not applicable.

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

	Sample ID: LaPlace		Matthias	Matthias	Matthias	Matthias	Ramsay	Ramsay	Ramsay	Ramsay	Smith	Smith	Smith	Smith
Analyte	Date:	3-Oct-91	1-Oct-90	5-Feb-91	6-Jun-91	3-Oct-91	1-Oct-90	5-Feb-91	5-Jun-91	1-Oct-91	25-Sep-90	5-Feb-91	6-Jun-91	3-Oct-91
Chloromethane	2.5 U	2 UJ	25 U	1 UJ	1.2 U	4 UJ	2 UJ	2 UJ	0.50 U	25 U	2 UJ	1 UJ	0.50 U	
Bromomethane	2.5 U	2 UJ	25 U	1 UJ	1.2 U	4 UJ	R	R	0.50 U	25 U	R	1 UJ	0.50 U	
Vinyl chloride	2.5 U	2 UJ	25 U	1 UJ	1.2 U	4 UJ	R	R	0.50 U	25 U	R	1 UJ	0.50 U	
Chloroethane	2.5 U	2 UJ	25 U	1 UJ	1.2 U	4 UJ	R	R	0.50 U	25 U	R	1 UJ	0.50 U	
Methylene chloride	4.6	9 UJ	25 U	2 UJ	1.9	17 UJ	1 U	R	0.50 U	12 UJ	1 U	1 UJ	0.50 U	
Acetone	10 U	R	25 U	2 UJ	5.0 U	R	R	15 J	2.0 U	25 UJ	R	R	2.0 U	
Carbon disulfide	2.2 J	1 UJ	12 UJ	0.5 UJ	5.0 U	2 UJ	1 UJ	R	2.0 U	12 UJ	1 UJ	0.5 UJ	2.0 U	
1,1-Dichloroethene	2.5 U	1 UJ	12 U	0.5 U	1.2 U	2 UJ	1 U	R	0.50 U	12 UJ	1 U	0.5 UJ	0.50 U	
1,1-Dichloroethane	2.5 U	1 U	12 U	0.5 U	1.2 U	2 UJ	1 U	R	0.50 U	12 U	1 U	0.5 UJ	0.06 J	
1,2-Dichloroethene (total)	170 D	22	21	36 J	19	2 UJ	1 J	2 J	2.8	58	42 J	62 D	56 D	
Chloroform	0.6 J	1 UJ	12 U	0.5 U	0.12 J	2 UJ	1 U	1 J	1.1	12 U	1 U	0.5 UJ	0.35 J	
1,2-Dichloroethane	2.5 U	1 UJ	12 U	0.5 U	1.2 U	2 UJ	1 U	1 UJ	0.50 U	12 UJ	1 U	0.5 UJ	0.50 U	
2-Butanone	10 U	R	25 U	R	5.0 U	R	R	R	2.0 U	25 UJ	R	R	2.0 U	
1,1,1-Trichloroethane	2.5 U	1 UJ	12 U	0.5 U	1.2 U	2 UJ	1 U	R	0.50 U	12 U	1 U	0.5 UJ	0.50 U	
Carbon tetrachloride	2.5 U	1 U	12 U	0.5 UJ	1.2 U	2 UJ	1 U	R	0.50 U	12 U	1 U	0.5 UJ	0.50 U	
Vinyl acetate	10 U	2 UJ	25 U	R	NA	4 UJ	2 U	R	2.0 U	25 UJ	2 UJ	1 UJ	NA	
Bromodichloromethane	2.5 U	1 U	12 U	0.5 U	1.2 U	2 UJ	1 U	R	0.39 J	12 U	1 U	0.5 UJ	0.50 U	
1,2-Dichloropropane	2.5 U	1 U	12 U	0.5 U	1.2 U	2 UJ	1 U	R	0.50 U	12 U	1 U	0.5 UJ	0.50 U	
cis-1,3-Dichloropropene	2.5 U	1 UJ	12 U	0.5 U	1.2 U	2 UJ	R	R	0.50 U	12 U	1 U	0.5 UJ	0.50 U	
Trichloroethene	30	11	7 J	12	8.6	2 UJ	1	R	1.6	20	23	26	20	
Dibromochloromethane	2.5 U	1 U	12 U	0.5 U	1.2 U	2 UJ	1 U	R	0.50 U	12 U	1 U	0.5 UJ	0.50 UJ	
1,1,2-Trichloroethane	2.5 U	1 U	12 U	4	1.2 U	2 UJ	1 U	R	0.50 U	12 U	5	0.5 UJ	0.50 U	
Benzene	2.5 U	1 U	12 U	0.5 U	1.2 U	2 UJ	1 U	R	0.50 U	12 U	1 U	0.5 UJ	0.1 J	
trans-1,3-Dichloropropene	2.5 UJ	1 UJ	12 U	0.5 U	1.2 UJ	2 UJ	1 U	R	0.50 UJ	R	R	0.5 UJ	0.50 UJ	
Bromoform	2.5 UJ	1 U	12 U	0.5 UJ	1.2 UJ	2 UJ	1 U	R	0.50 UJ	12 UJ	1 U	0.5 UJ	0.50 UJ	
4-Methyl-2-pentanone	10 U	2 UJ	25 U	1 U	5.0 U	4 UJ	2 UJ	R	2.0 U	25 UJ	2 UJ	1 UJ	2.0 U	
2-Hexanone	10 U	R	25 U	1 U	5.0 U	R	R	R	2.0 U	25 UJ	2 UJ	1 UJ	2.0 U	
Tetrachloroethene	100 D	120 J	76	59 DJ	81	3 J	16	16	19	330 J	160 J	190 D	250 D	
1,1,2,2-Tetrachloroethane	2.5 U	1 UJ	12 U	0.5 U	1.2 U	2 UJ	1 U	R	0.50 U	12 UJ	1 U	0.5 UJ	0.50 U	
Toluene	2.5 U	1 U	12 U	0.5 UJ	1.2 U	2 UJ	1 U	R	0.50 U	12 U	1 U	0.5 UJ	0.50 U	
Chlorobenzene	2.5 U	1 U	12 U	0.5 UJ	1.2 U	2 UJ	1 U	R	0.50 U	12 U	1 U	0.5 UJ	0.50 U	
Ethylbenzene	2.5 U	1 U	12 U	0.5 UJ	1.2 U	2 UJ	1 U	R	0.50 U	12 U	1 U	0.5 UJ	0.50 U	
Styrene	2.5 U	1 UJ	12 U	0.5 UJ	1.2 U	2 UJ	1 U	R	0.50 U	12 U	1 UJ	0.5 UJ	0.50 U	
Xylenes (total)	2.5 U	1 UJ	12 U	0.5 UJ	1.2 U	2 UJ	1 U	R	0.50 U	12 U	1 UJ	0.5 UJ	0.50 U	

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

Analyses were performed by Ceimic Corporation of Narragansett, Rhode Island, or Enseco-East of Somerset, New Jersey, using USEPA Method 524.2.

D Compound identified at a secondary dilution.
 E Concentration exceeds calibration range.
 J Result is detected below the reporting limit or is an estimated concentration.
 U Compound analyzed for but not detected.
 R Result rejected.

FR Sample ID suffix denotes field replicate of previous sample.

NA Not applicable.

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TUT 002 2442

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

	Sample ID: Steele		Steele	Steele	Steele	Tillett	Tillett FR	Tillett	Tillett	Tillett	Tillett FR	Field Blank	Field Blank	Trip Blank
Analyte	Date:	25-Sep-90	5-Feb-91	5-Jun-91	1-Oct-91	2-Oct-90	2-Oct-90	5-Feb-91	5-Jun-91	2-Oct-91	2-Oct-91	5-Feb-91	1-Oct-91	24-Sep-90
Chloromethane		17 UJ	10 U	1 UJ	0.50 U	R	R	2 U	1 U	2.5 U	0.50 U	2 U	0.50 U	2 U
Bromomethane		17 UJ	10 U	1 U	0.50 U	R	R	2 U	1 U	2.5 U	0.50 U	2 U	0.50 U	2 U
Vinyl chloride		17 UJ	10 U	4	2.5	17 J	12 J	7	5	17 J	11 J	2 U	0.50 U	2 U
Chloroethane		17 UJ	10 U	1 UJ	0.50 U	R	R	2 U	1 U	2.5 U	0.50 U	R	0.50 U	2 U
Methylene chloride		140 UJ	5 U	0.5 UJ	0.50 U	R	R	1 U	5 U	2.5 U	0.50 U	2	0.50 U	25 J
Acetone		R	10 U	R	2.0 U	R	R	R	R	10 U	2.0 U	R	2.0 U	12 J
Carbon disulfide		8 UJ	5 U	0.5 U	2.0 U	R	R	1 UJ	0.5 U	10 U	2.0 U	1 UJ	2.0 U	1 UJ
1,1-Dichloroethene		8 UJ	5 U	0.5 U	0.12 J	R	R	1 U	0.5 U	2.5 U	0.50 U	1 U	0.50 U	1 UJ
1,1-Dichloroethane		8 U	5 U	0.5 U	0.11 J	R	R	1 U	0.5 U	2.5 U	0.50 U	1 U	0.50 U	1 UJ
1,2-Dichloroethene (total)		120	44	180 DJ	150 D	280 J	270 J	200 D	400 DEJ	150	140 D	1 U	0.50 U	1 UJ
Chloroform		8 UJ	5 U	0.5 U	0.50 U	R	R	1 U	0.9	2.5 U	0.50 U	1 U	0.50 U	1 UJ
1,2-Dichloroethane		8 UJ	5 U	0.5 U	0.50 U	R	R	1 U	0.5 U	2.5 U	0.50 U	1 U	0.50 U	1 UJ
2-Butanone		R	10 U	R	2.0 U	R	R	R	R	10 U	2.0 U	R	2.0 U	R
1,1,1-Trichloroethane		8 UJ	5 U	0.5 U	0.50 U	R	R	1 U	0.5 U	2.5 U	0.50 U	1 U	0.50 U	1 UJ
Carbon tetrachloride		8 U	5 U	0.5 U	0.50 U	R	R	1 U	0.5 UJ	2.5 U	0.50 U	1 U	0.50 U	1 UJ
Vinyl acetate		17 UJ	10 UJ	1 U	2.0 U	R	R	2 UJ	1 U	NA	NA	R	2.0 U	R
Bromodichloromethane		8 U	5 U	0.5 U	0.50 U	R	R	1 U	0.5 U	2.5 U	0.50 U	1 U	0.50 U	1 U
1,2-Dichloropropane		8 U	5 U	0.5 U	0.50 U	R	R	1 U	0.5 U	2.5 U	0.50 U	1 U	0.50 U	1 UJ
cis-1,3-Dichloropropene		8 UJ	5 U	0.5 U	0.50 U	R	R	R	0.5 U	2.5 U	0.50 U	R	0.50 U	1 U
Trichloroethene		48	12	42 DJ	29	56 J	47 J	36	72 DJ	38	35	1 U	0.50 U	1 UJ
Dibromochloromethane		8 U	5 U	0.5 U	0.50 UJ	R	R	1 U	0.5 U	2.5 U	0.50 UJ	1 U	0.50 U	1 UJ
1,1,2-Trichloroethane		8 U	5 U	0.5 U	0.50 U	R	R	1 U	4	2.5 U	0.50 U	1 U	0.50 U	1 UJ
Benzene		8 U	5 U	0.5 U	0.08 J	32 J	26 J	27	3 J	71 J	58 DJ	1 U	0.50 U	1 UJ
trans-1,3-Dichloropropene		8 UJ	5 U	0.5 U	0.50 UJ	R	R	1 U	0.5 U	2.5 UJ	0.50 UJ	1 U	0.50 UJ	1 UJ
Bromoform		8 UJ	5 U	0.5 U	0.50 UJ	R	R	1 U	0.5 U	2.5 UJ	0.50 UJ	1 U	0.50 UJ	1 UJ
4-Methyl-2-pentanone		17 UJ	10 U	1 U	2.0 U	R	R	2 UJ	1 U	10 U	2.0 U	2 UJ	2.0 U	2 UJ
2-Hexanone		R	10 U	1 U	2.0 U	R	R	2 UJ	1 U	10 U	2.0 U	2 UJ	2.0 U	R
Tetrachloroethene		130 J	65	150 DJ	54 D	120 J	98 J	100 D	180 DJ	66	63 D	1 U	0.50 U	1 UJ
1,1,2,2-Tetrachloroethane		8 UJ	5 U	0.5 U	0.50 U	R	R	1 U	0.5 U	2.5 U	0.50 U	1 U	0.50 U	1 UJ
Toluene		8 U	5 U	0.5 UJ	0.50 U	R	R	1	0.8 J	3 J	2.1 J	1 U	0.50 U	1 U
Chlorobenzene		8 U	5 U	0.5 UJ	0.13 J	R	R	1 U	0.5 UJ	2.5 U	0.2 J	1 U	0.50 U	1 UJ
Ethylbenzene		8 U	5 U	0.5 UJ	0.50 U	R	R	1	0.5 UJ	17	14	1 U	0.50 U	1 U
Styrene		8 UJ	5 U	0.5 UJ	0.50 U	R	R	1 U	0.5 UJ	2.5 U	0.50 U	1 U	0.50 U	1 UJ
Xylenes (total)		8 UJ	5 U	0.5 UJ	0.50 U	R	R	1 U	0.5 UJ	3.6 J	2.7 J	1 U	0.50 U	8

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

Analyses were performed by Cemic Corporation of Narragansett, Rhode Island, or Enseco-East of Somerset, New Jersey, using USEPA Method 524.2.

D Compound identified at a secondary dilution.
 E Concentration exceeds calibration range.
 J Result is detected below the reporting limit or is an estimated concentration.
 U Compound analyzed for but not detected.
 R Result rejected.

FR Sample ID suffix denotes field replicate of previous sample.

NA Not applicable.

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Table 7. Comparative Results of Analysis for Concentrations of Volatile Organic Compounds in Ground-Water Samples Collected from September 1990 to October 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	Trip Blank	Trip Blank	Trip Blank	Water Blank
Analyte	Date:	25-Sep-90	26-Sep-90	27-Sep-90	1-Oct-90	2-Oct-90	3-Oct-90	4-Jun-91	5-Jun-91	6-Jun-91	1-Oct-91	2-Oct-91	3-Oct-91	3-Oct-91
Chloromethane		2 U	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	9 J	2 J	6 J	0.50 U	0.50 U	0.50 U	0.50 U
Bromomethane		2 U	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	1 UJ	1 UJ	1 UJ	0.50 U	0.50 U	0.50 U	0.50 U
Vinyl chloride		2 U	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	1 UJ	1 UJ	1 UJ	0.50 U	0.50 U	0.50 U	0.50 U
Chloroethane		2 U	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	1 UJ	1 UJ	1 UJ	0.50 U	0.50 U	0.50 U	0.50 U
Methylene chloride		34 J	24 J	16 J	13 J	14 J	1 UJ	0.8 J	1 UJ	0.9 J	0.50 U	0.6	0.17 J	0.26 J
Acetone		42 J	4 J	R	6 J	7 J	R	11 J	R	8 J	2.0 U	3.2	2.0 U	2.0 U
Carbon disulfide		1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.21 J	1.4 J	0.25 J	0.73 J
1,1-Dichloroethene		1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	0.5 U	0.5 UJ	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U
1,1-Dichloroethane		1 UJ	1 U	1 U	1 UJ	1 UJ	1 UJ	0.5 U	0.5 UJ	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloroethene (total)		1 UJ	1 U	1 U	1 UJ	1 UJ	1 UJ	0.5 U	0.5 UJ	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U
Chloroform		1 UJ	1 UJ	1 U	1 UJ	1 UJ	1 UJ	0.5 U	0.5 UJ	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloroethane		1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	2	1 J	2	0.50 U	0.50 U	0.50 U	0.50 U
2-Butanone		R	R	R	R	R	R	R	R	R	2.0 U	2.0 U	2.0 U	2.0 U
1,1,1-Trichloroethane		1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	0.5 U	0.5 UJ	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U
Carbon tetrachloride		1 UJ	1 U	1 U	1 UJ	1 UJ	1 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.50 U	0.50 U	0.50 U	0.50 U
Vinyl acetate		R	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	R	1 UJ	R	2.0 U	2.0 U	2.0 U	2.0 U
Bromodichloromethane		1 U	1 U	1 U	1 UJ	1 UJ	1 UJ	0.5 U	0.5 UJ	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloropropane		1 UJ	1 U	1 U	1 UJ	1 UJ	1 UJ	0.5 U	0.5 UJ	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U
cis-1,3-Dichloropropene		1 U	1 UJ	1 U	1 UJ	1 UJ	1 UJ	0.5 U	0.5 UJ	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U
Trichloroethene		1 UJ	1 U	1 U	1 UJ	1 UJ	1 UJ	0.5 U	0.5 UJ	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U
Dibromochloromethane		1 UJ	1 U	1 U	1 UJ	1 UJ	1 UJ	0.5 U	0.5 UJ	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2-Trichloroethane		1 UJ	1 U	1 UJ	1 UJ	1 UJ	1 UJ	0.5 U	0.5 UJ	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U
Benzene		1 UJ	1 U	1 U	1 UJ	1 UJ	1 UJ	0.5 U	0.5 UJ	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U
trans-1,3-Dichloropropene		1 UJ	1 UJ	1 UJ	R	R	1 UJ	0.5 U	0.5 UJ	0.5 U	0.50 UJ	0.50 UJ	0.50 UJ	0.50 UJ
Bromoform		1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.50 UJ	0.50 UJ	0.50 UJ	0.50 UJ
4-Methyl-2-pentanone		2 UJ	1 UJ	2 UJ	2 UJ	2 UJ	2 UJ	1 U	1 UJ	1 U	2.0 U	2.0 U	2.0 U	2.0 U
2-Hexanone		R	R	R	R	R	R	1 U	1 UJ	0.8 J	2.0 U	2.0 U	2.0 U	2.0 U
Tetrachloroethene		1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	0.5 U	0.5 UJ	0.5 U	0.50 U	0.1 J	0.50 U	0.50 U
1,1,2,2-Tetrachloroethane		1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	0.5 U	0.5 UJ	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U
Toluene		1 J	1 U	1 U	1 UJ	1 UJ	1 UJ	2	0.5 UJ	2	0.1 J	0.50 U	0.50 U	0.05 J
Chlorobenzene		1 UJ	1 U	1 U	1 UJ	1 UJ	1 UJ	0.5 U	5 UJ	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U
Ethylbenzene		1 U	1 U	1 U	1 UJ	1 UJ	1 UJ	0.5 U	0.5 UJ	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U
Styrene		1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	0.5 U	0.5 UJ	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U
Xylenes (total)		7	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	0.5 U	0.5 UJ	0.5 U	0.28 J	0.11 J	0.25 J	0.50 U

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

Analyses were performed by Ceimic Corporation of Narragansett, Rhode Island, or Enseco-East of Somerset, New Jersey, using USEPA Method 524.2.

D Compound identified at a secondary dilution.
 E Concentration exceeds calibration range.
 J Result is detected below the reporting limit or is an estimated concentration.
 U Compound analyzed for but not detected.
 R Result rejected.

FR Sample ID suffix denotes field replicate of previous sample.

NA Not applicable.

TUT 002 2444

GERAGHTY & MILLER, INC.

Table 8. Proposed Sampling Effort for the Fifth Sampling Event, February 1992, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Well	Proposed Analytes
Eglin I	TCL VOCs, TCL Semi-Volatiles, TAL Metals and Cyanide
Eglin II	TCL VOCs, TCL Semi-Volatiles, TAL Metals and Cyanide
Eglin III	TCL VOCs, TCL Semi-Volatiles, TAL Metals and Cyanide
Four Winds I	TCL VOCs, TCL Semi-Volatiles, TAL Metals and Cyanide
Four Winds II	TCL VOCs, TCL Semi-Volatiles, TAL Metals and Cyanide
Gassett	TCL VOCs, TCL Semi-Volatiles, TAL Metals and Cyanide
Hartman II	TCL VOCs, TCL Semi-Volatiles, TAL Metals and Cyanide
Hartman III	TCL VOCs, TCL Semi-Volatiles, TAL Metals and Cyanide
Harvey	TCL VOCs, TCL Semi-Volatiles, TAL Metals and Cyanide
LaPlace	TCL VOCs, TCL Semi-Volatiles, TAL Metals and Cyanide
Matthias	TCL VOCs, TCL Semi-Volatiles, TAL Metals and Cyanide
Ramsay	TCL VOCs, TCL Semi-Volatiles, TAL Metals and Cyanide
Smith	TCL VOCs, TCL Semi-Volatiles, TAL Metals and Cyanide
Steele	TCL VOCs, TCL Semi-Volatiles, TAL Metals and Cyanide
Tillett	TCL VOCs, TCL Semi-Volatiles, TAL Metals and Cyanide
VIHA I or VIHA II (if possible)	TCL VOCs, TCL Semi-Volatiles, TAL Metals and Cyanide

TCL - Target Compound List.

VOCs - Volatile organic compounds.

TAL - Target Analyte List.

VIHA I has an inoperable pump.

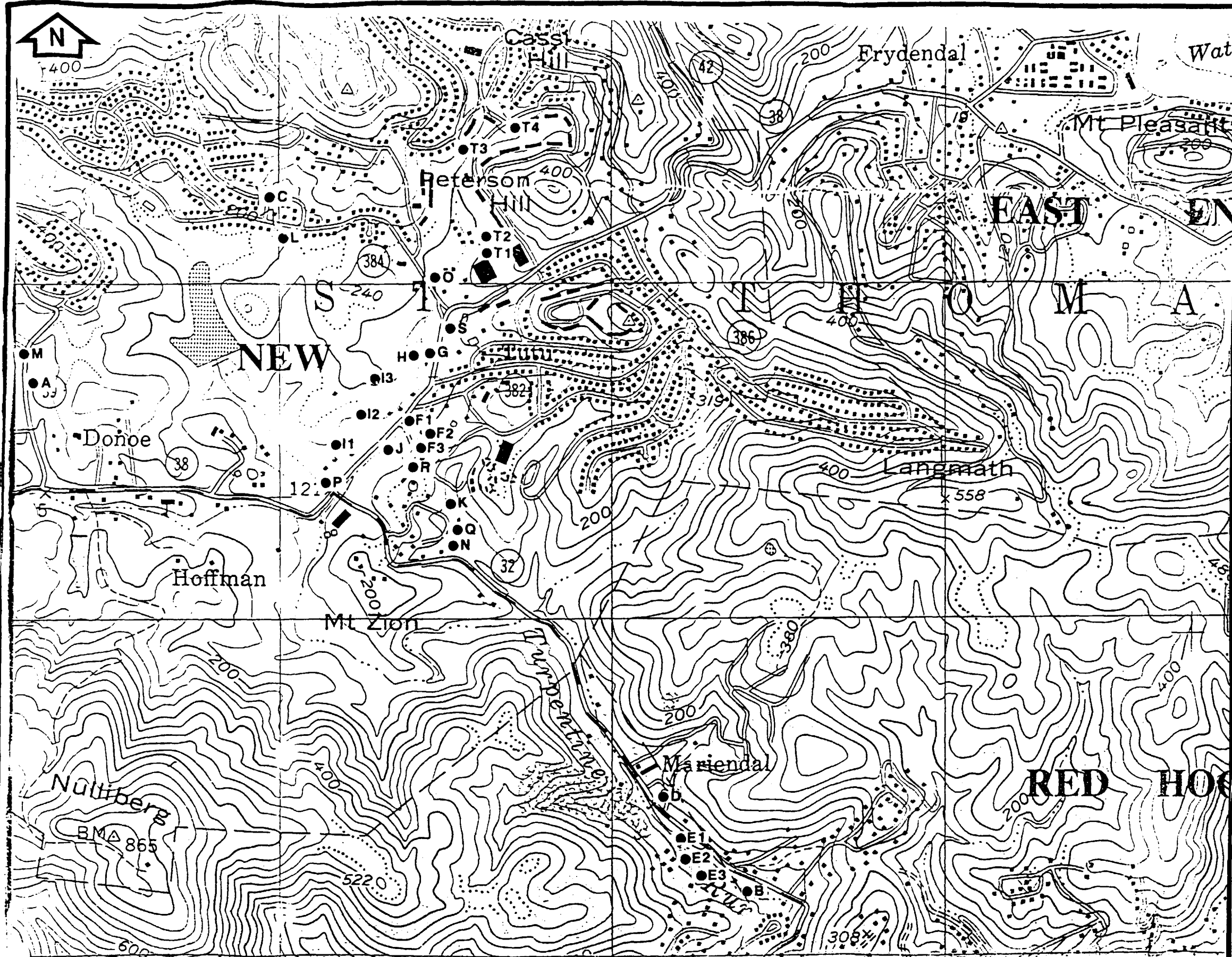
All analyses will be performed in accordance with revised SAMP (Geraghty & Miller, Inc. 1991d).

TD:gv
#PR00801/4thqtr.rpt

TUT 002 2445

FIGURE

TUT 002 2446



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

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 RAMSAY
- 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, U.S. VIRGIN ISLANDS			
PREPARED FOR			
TEIC			
Geraghty & Miller, Inc.	COMPILED BY DANAHY	SCALE SHOWN DATE 8/91	FIGURE 1
	PREPARED BY PADULA		
	PROJECT MGR DANAHY		

APPENDIX A

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

TOTAL REVIEW

CLP DATA ASSESSMENT

Functional Guidelines for Evaluating Organics Analysis

Case Nos. 16803,16777,16606 SDG No. NA LABORATORY Enseco-East 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 quality control (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: 1/16/92

Verified by: _____

Date: 1/16/92

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:

All of the samples in this sample delivery group (SDG) were analyzed within the specified holding time as calculated from sample collection to volatile organic compound (VOC) analyses. Therefore, the associated data do not require qualification. A holding time non-compliance summary for all samples is provided in A-1.

2. BLANK CONTAMINATION

Quality assurance (QA) blanks, i.e., method, trip, field, rinse, and water blanks are prepared to identify any contamination that 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) Method Blank Contamination

All of the method blanks associated with the VOC analyses were reviewed to determine laboratory contamination levels.

The method blank VBLK01 (10/4/91) is reported to contain 0.07 micrograms per liter (ug/L) of toluene. Samples Steele, Smith, Harvey, Eglin III, Four Winds I, and Tillett FR (field replicate) are associated with this blank. Toluene was detected in samples Eglin III, Harvey, and Smith at concentrations below the

contract required quantitation limit (CRQL) and less than ten times ($< 10x$) the amount detected in the method blank. Therefore the toluene data for these samples are raised to the CRQL, negated, and qualified "U." Toluene was also detected in sample Steele, but the associated trip blank (10/1/91), is used to qualify the sample data since it contains a higher level of toluene. Toluene was undetected in sample Four Winds I; therefore the associated result does not require qualification. Toluene was detected in sample Tillett FR at a concentration greater than ten times ($> 10x$) the amount detected in the method blank; therefore this result also does not require qualification.

The method blank VBLK03 (10/8/91) is reported to contain 0.17 ug/L of methylene chloride. The trip blank (10/1/91) is associated with this blank. Methylene chloride was detected in the trip blank at a concentration below the CRQL and $< 10x$ the amount detected in the method blank; therefore this result is raised to the CRQL, negated, and qualified "U."

Method blanks VBLK02 (10/6/91), VBLK02 (10/5/91), and VBLK03 (10/6/91) are all free of contamination.

B) Field or Water Blank Contamination

The field blank is a sample of deionized (DI) water passed through the decontaminated sampling equipment. It is used to identify any contaminant that may still be present in the sampling equipment and therefore may result in subsequent sample contamination. The water blank is a sample of the DI water received from the source. The water blank helps identify any contaminant inherently present, and to distinguish from contamination introduced as a result of field activity.

For the fourth quarter Tutu Well Site Sampling effort, well Gassett was sampled using a bailer. The remainder of the wells did not require any sampling equipment as all of the other wells had pumps installed. Therefore, the field blank and water blank collected are associated only with sample Gassett and are used to qualify this sample only.

The water blank (10/3/91) is reported to contain the following compounds:

<u>Compound</u>	<u>Amount detected (ug/L)</u>
Methylene chloride	0.26 J
Carbon disulfide	0.73 J
Toluene	0.050 J

In addition, two tentatively identified compounds (TICs) were also detected in the water blank. They are tentatively identified and estimated as follows: 17 ug/L of hexane (Retention time [RT] equal to [=] 6.74) and 12 ug/L of methyl cyclopentane (RT=8.11).

Sample Gassett and the field blank (10/1/91) are associated with the water blank. They are both reported to contain methylene chloride and carbon disulfide at concentrations below the CRQL and < 10x the amount detected in the water blank; therefore the associated data for these two compounds in the samples are raised to the CRQL, negated and qualified "U."

Toluene data in sample Gassett and the associated field blank are not qualified based on the water blank because the associated trip blank (10/1/91) is reported to contain a higher concentration of toluene and will be used to qualify these samples.

Methyl cyclopentane is detected in the associated field blank at a concentration < 5x the amount detected in the water blank. Therefore, this result in the field blank is rejected (R) due to water blank contamination and is unusable.

The field blank (10/1/91) is reported to contain the following compounds:

<u>Compound</u>	<u>Amount detected (ug/L)</u>
Methylene chloride	0.21 J
Carbon disulfide	0.68 J

In addition, two TICs were detected in the field blank. They are tentatively identified and estimated as follows: 43 ug/L of a 6-carbon hydrocarbon isomer (RT=6.75), and 11 ug/L of methyl cyclopentane (RT=8.12). Sample Gassett is associated with this blank.

The methylene chloride and carbon disulfide data for the field blank (10/1/91) are already negated due to the water blank. A 6-carbon hydrocarbon isomer (TIC)

was detected in sample Gassett at a concentration $< 5\times$ the amount detected in the field blank; therefore the associated result is rejected and qualified "R", unusable.

C) Trip Blank Contamination

The trip blank (10/1/91) is reported to contain the following compounds:

<u>Compound</u>	<u>Amount detected (ug/L)</u>
Methylene chloride	0.26 JB
Carbon disulfide	0.21 J
Toluene	0.10 J
Xylenes (total)	0.28 J

Samples Hartman (III), Hartman (II), Steele, Tillett FR, and Gassett are associated with this blank. As previously discussed, the methylene chloride result for this trip blank (10/1/91) is negated based on the associated method blank level. Methylene chloride was detected in samples Hartman (II), Hartman (III), Ramsay, and Steele at concentrations below the CRQL. Methylene chloride was also detected at estimated concentrations in the method blank VBLK03 (10/8/91), which is attributed to laboratory sample preparation and analytical procedures; therefore these data are raised to the CRQL, negated, and qualified "U."

Carbon disulfide was detected in sample Ramsay and Gassett. As previously discussed the carbon disulfide result for sample Gassett is negated due to water blank contamination. The concentration of carbon disulfide in sample Ramsay is below the CRQL and $< 10\times$ the amount detected in the associated trip blank (10/1/91). Therefore, this result is raised to the CRQL, negated, and qualified "U."

Toluene was detected in samples Steele and Gassett at concentrations below the CRQL and $< 10\times$ the amount detected in the trip blank; therefore the associated sample data are raised to the CRQL, negated, and qualified "U."

Xylenes (total) were detected in samples Ramsay, Hartman (II), and Gassett at concentrations below the CRQL and $< 10\times$ the amount detected in the associated trip blank; therefore the associated sample data are raised to the CRQL, negated, and qualified "U."

The trip blank (10/2/91) is reported to contain the following compounds:

<u>Compound</u>	<u>Amount detected (ug/L)</u>
Methylene chloride	0.60
Acetone	3.2
Carbon disulfide	1.4 J
Tetrachloroethene	0.10 J
Xylenes (total)	0.11 J

Samples Harvey, Eglin I, Eglin II, Eglin III, Four Winds I, Four Winds II, Tillett, and Tillett FR are associated with this blank.

Methylene chloride was detected in samples Harvey, Eglin I, Eglin II, Four Winds I, and Four Winds II at concentrations < 10x the amount detected in the associated trip blank; therefore these data are negated and qualified "U." Methylene chloride results in Four Winds I, Four Winds II, and Harvey are below the CRQL; therefore, these results are raised to the CRQL and qualified "U."

Carbon disulfide was detected in samples Eglin I and Four Winds II at concentrations < 5x the amount detected in the associated blank; therefore these data are negated and qualified "U." The carbon disulfide result in Four Winds II is below the CRQL; therefore it is raised to the CRQL and qualified "U."

Xylenes (total) were detected in samples Eglin III and Four Winds I at concentrations < 10x the amount detected in the associated blank; therefore these data are negated and qualified "U".

Tetrachloroethene (PCE) was detected in all of the samples associated with this trip blank. These results are > 10x the amount detected in the blank; therefore these data do not require qualification. Acetone was not detected in any of the associated samples; therefore these data do not require qualification.

The trip blank (10/3/91) is reported to contain the following compounds:

<u>Compound</u>	<u>Amount detected (ug/L)</u>
Methylene chloride	0.17 J
Carbon disulfide	0.25 J
Xylenes (total)	0.25 J

Samples Smith, Matthias, and LaPlace are associated with this blank.

Methylene chloride was detected in sample Smith at a concentration below the CRQL and $< 10\times$ the amount detected in the associated blank; therefore, this result is raised to the CRQL, negated, and qualified "U." LaPlace and Matthias are reported to contain $> 10\times$ the amount of methylene chloride detected in the associated trip blank; therefore these data do not require qualification.

Carbon disulfide was detected in sample LaPlace. LaPlace is reported to contain $> 5\times$ the amount of carbon disulfide detected in the associated trip blank; therefore this result does not require qualification.

Xylenes (total) were detected in samples Smith and Matthias at concentrations below the CRQL and $< 10\times$ the amount detected in the associated blank; therefore these data are raised to the CRQL, negated, and qualified "U."

A summary of all contaminated blanks and associated samples is provided in Table A-2.

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 VOCs is bromofluorobenzene (BFB).

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

All mass calibrations associated with the VOC analyses in this SDG have met the QC criteria to ensure adequate mass resolution, proper compound identification and instrument response.

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). For analytes detected in the sample for which the response factor is < 0.05 , positive detects will be qualified as estimated, (J). All non-detects for that compound will be rejected (R).

As per method 524.2, Revision 3.0, the average response factor of an analyte can be used if the corresponding percent relative standard deviation is $< 20\%$. The response factor for all analytes in the initial calibration performed on October 4, 1991 on instrument HP-V2 meet the required criteria; therefore these data do not require qualification.

5. CALIBRATION

(B) 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. Under Revision 3.0 for Method 524.2 %RSD must be $< 50\%$ and %D must be $< 30\%$. A value outside of these limits indicates potential detection and quantitation errors. If the %D is between 30 and 50%, the qualifying action is based on the reviewer's judgment. 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).

All of the %RSDs and %Ds from all of the continuing calibrations are within QC limits; therefore data qualification is unnecessary.

6. SURROGATES

All samples are spiked with surrogate compounds prior to sample preparation or analysis 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.

Volatile surrogate percent recoveries (%Rs) for this SDG are within the corresponding QC limits (toluene-d8 [88-110%], bromofluorobenzene [86-115%], 1,2-dichloroethane-d4 [76-114%]). %R data were transcribed correctly from the quantitation reports to the Form IIIs.

7. INTERNAL STANDARDS PERFORMANCE

Internal standard (IS) performance criteria ensure that the gas chromatograph/mass spectrophotometer (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 judgment to determine either partial or total rejection of the data for that sample fraction.

All of the IS area counts and retention times are within above mentioned QC limits for the VOC analyses. Bromochloromethane, 1,4-difluorobenzene, and chlorobenzene were the three internal standards used to quantitate the data for this SDG. All retention times, area counts, and chromatography for the IS compounds are acceptable.

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 that has a ratio of the primary and secondary m/e intensities within 20% of that in the standard compound. For the TICs, the ion spectra must match accurately. In 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 standard spectra. Positive hits were reviewed for all samples and the following discrepancies were noted in meeting the RRT criteria of ± 0.06 .

RRT criteria were exceeded in the VOC analyses for total xylenes. This discrepancy is attributed to the difference in response and resolution of the three isomers of xylene (*ortho*, *meta*, and *para*). Two of the three isomeric xylenes are structural isomers that produce very similar mass spectra that may not be resolvable on the capillary column because they do not have sufficiently different GC retention times. As such, they are reported as xylenes (total). The ionic spectra for xylenes (total) in all samples except Hartman (II) accurately match the standard compound spectrum. However, all positive detects for total xylenes in the SDG, except for Tillett and Tillett FR, are negated, since the detected concentration is $< 10\times$ the amount detected in the associated blank (previously discussed under blank contamination). Positive data for xylenes (total) in samples Tillett and Tillett RE do not require qualification.

RRT criteria were also exceeded in the analyses of total 1,2-dichloroethene (1,2-DCE). This discrepancy is also attributed to the presence of isomers. 1,2-DCE exists as *cis* and *trans* isomers, which are not entirely resolvable using Method 524.2, Revision 3.0. Since the relative intensity between the two isomer peaks varies, quantitation is based on the retention time of the peak with the higher intensity. As the ionic spectra for 1,2-DCE accurately matches the standard compound spectrum, no data have been qualified based on RRT deviations.

TICs with positive identifications based on presumptive evidence of the detected compound as an estimated value are qualified "JN." All TIC data are qualified as estimated (J), since these compounds are not calibrated for.

9. MATRIX SPIKE/MATRIX SPIKE DUPLICATE

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

The MS and MSD were performed on sample Gassett to determine sample matrix interferences on the analytical results. The sample was spiked in duplicate at a level of 5 ug/L with the following analytes (QC limits for recovery are within parentheses): 1,1-dichloroethene (61-145%), trichloroethene (71-120%), benzene (76-127%), toluene (76-125%), and chlorobenzene (75-130%). All ten matrix spike %Rs meet specified QC criteria. Relative percent differences (RPDs) between matrix spike and matrix spike duplicate %Rs are within QC limits (11-14%). Therefore, it appears that there is no matrix bias affecting the data.

10. OTHER QC DATA OUT OF SPECIFICATION

A) Method Detection Limit Study

The method detection limit (MDL) study associated with Method 524.2 was performed on July 29, 1991. The MDL determination was based on the analysis of seven replicates of reagent water fortified at a concentration of 1.0 ug/L (ketones at 5 ug/L, and 1,2-DCE at 2 ug/L) with the TCL analytes.

The laboratory MDL was calculated as the product of the standard deviation of seven replicate analyses and the student's t value for the 99% confidence level with six degrees of freedom ($t = 3.143$).

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 October 1991 analyses for the Tutu Wells site, the following analytes did not meet the accuracy criteria required prior to sample analyses:

<u>Analyte</u>	<u>Mean Accuracy (%)</u>
Methylene chloride	137
2-Butanone	79
Dibromochloromethane	68
trans 1,3-Dichloropropane	70
Bromoform	56

The %RSDs for all analytes were within QC criteria ($< 20\%$). None of the data is qualified based on the results from the MDL study.

B) Laboratory Fortified Blanks

As per the QC requirements in Method 524.2 (Revision 3.0) and the site Sampling, Analysis, and Monitoring Plan (SAMP), a laboratory fortified blank (LFB) containing each target analyte at a known concentration is to be analyzed with every batch of samples processed using the method. For the fourth quarter Tutu Wells Site sampling effort, LFBs were prepared at a concentration of 1 ug/L for all TCL analytes except ketones and 1,2-DCE. Ketones were analyzed at 5 ug/L and 1,2-DCE was analyzed at 2 ug/L. The 1,2-DCE matrix fortification comprised of 1 ug/L of the *cis* isomer and 1 ug/L of the *trans* isomer injected together, and quantitated as total 1,2-DCE. The LFBs were used to evaluate the accuracy of the method and estimate whether MDLs were achieved for every associated analytical sequence. If the laboratory did not meet these QC criteria, the deficiencies had to be rectified prior to further sample analyses (as specified in Method 524.2, Section 10.3).

QC criteria for data assessment were modified for the VOC analyses of the Tutu well samples. Based on USEPA 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 were expanded to 50-150%, but only for the ketones (acetone, 2-butanone, 4-methyl-2-pentanone, and 2-hexanone). Therefore, for this validation, associated data for all TCL analytes with LFB recoveries $< 50\%$ are rejected and qualified "R." For LFB analyte recoveries in the range of 50-79% for TCL analytes other than ketones, the associated sample data are qualified as estimated (J). For LFB analyte recoveries $> 150\%$, associated sample data are not qualified. The LFBs associated with this SDG, which have analyte recoveries outside of the required QC guidelines, are summarized below.

Two LFBs were run on 10/4/91. The first, VLFB, analyzed on 10/4/91 at injection time 18:01, has %Rs outside QC limits for the following compounds:

<u>Compound</u>	<u>Recovery (%)</u>
trans-1,3-Dichloropropene	77
Dibromochloromethane	79
Bromoform	66

The second, VLFB, analyzed on 10/4/91 at injection time 18:39, has %Rs outside QC limits for the following compounds:

<u>Compound</u>	<u>Recovery (%)</u>
trans-1,3-Dichloropropene	75
Dibromochloromethane	77
Bromoform	63

Samples Steele, Smith, Harvey, Eglin III, Four Winds I, and Tillett FR are associated with this blank. Associated sample data for all three analytes are qualified as estimated (J) or estimated at the quantitation limit (UJ).

VLFB (10/5/91) has %Rs outside QC limits for the following compounds:

<u>Compound</u>	<u>Recovery (%)</u>
trans-1,3-Dichloropropene	79
Bromoform	73

Samples Matthias, LaPlace, Eglin I, Eglin II, and trip blank 10/2/91 are associated with this blank. Associated sample data for both analytes are qualified as estimated (J) or estimated at the quantitation limit (UJ).

VLFB (10/6/91) has %Rs outside QC limits for the following compounds:

<u>Compound</u>	<u>Recovery (%)</u>
trans-1,3-Dichloropropene	77
Bromoform	70

Samples Hartman (III), Hartman (II), Ramsay, Gassett, field blank (10/1/91), trip blank (10/1/91), water blank (10/3/91), trip blank (10/3/91), Four Winds II, and Tillett are all associated with this blank. Associated sample data for both analytes

are qualified as estimated (J) or estimated at the quantitation limit (UJ). Recovery of all other analytes are within QC criteria; therefore associated data do not require qualification. The precision requirement between replicate measurements in the MDL study ($RSD < 20\%$) was met for all compounds.

The VLFB (10/8/91) meets the required recovery criteria for all analytes.

C) Field Duplicate

Field duplicate or replicate, samples may be taken and analyzed as an indication of overall precision. These analyses measure both field and laboratory precision; therefore, the results may have more variability than laboratory duplicates that measure only laboratory performance.

Sample Ramos (listed as such on the chain-of-custody record) is a field replicate of Tillett, and in all discussions and tables in this report is referred to as a Tillett FR. The results reported for both samples Tillett and Tillett FR were compared and the RPD calculated for vinyl chloride, 1,2-dichloroethene cis/trans, trichloroethene, benzene, tetrachloroethene, toluene, ethylbenzene, and xylenes (total). The RPD between results in both samples is calculated only for positive detects greater than four times the method detection limit, and not for estimated or undetected results. Vinyl chloride, toluene, benzene, and xylenes (total) are found to have a $RPD > 20\%$, and therefore data for these analytes are estimated in both sample Tillett and its replicate Tillett FR.

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 person using the data concerning data quality and data limitations to assist the individual in avoiding inappropriate use of the data. Therefore, this review has presented all QC factors that may affect the quality of the data.

Overall, the data submitted by Enseco-East are of good quality and acceptable completeness. Aside from the exceptions summarized below, the majority of the data for this SDG are valid and usable.

Much of the sample data for methylene chloride, carbon disulfide, xylene, and toluene are negated since their presence is the result of laboratory contamination. One tentatively identified compound in sample Gassett is rejected since its presence is due to field blank contamination.

All sample data for trans-1,3-dichloropropene, bromoform, and some sample data for dibromochloromethane, are estimated due to poor recovery in all associated LFBs.

Data for vinyl chloride, 1,2-dichloroethene (total), trichloroethene, benzene, tetrachloroethene, toluene, ethylbenzene, and xylenes (total) are estimated in two samples where the field replicate results varied more than 20% from the sample results.

All TICs in this SDG are qualified as (J), because the laboratory does not calibrate the GC/MS for these compounds. TICs that are "positively identified" are qualified (JN), indicating presumptive evidence of the detected compound at an estimated value.

TCL analytes that required re-analysis upon dilution are qualified "D."

The July 1991 MDL study resulted in some compounds not meeting the preliminary accuracy requirements needed to establish the baseline MDL for the low level analysis. The same compounds (trans-1,3-dichloropropene, bromoform, and dibromochloromethane) that had poor recovery in the LFB analyses, had low recovery in the MDL accuracy measurement criteria. In addition, recovery of 2-butanone was also below the 80-120% recovery criteria. The precision requirement between replicate measurements in the MDL study ($RSD < 20\%$) was met for all compounds. Methylene chloride had an elevated recovery that can be attributed to laboratory contamination.

12. CONTRACT PROBLEMS (NON-COMPLIANCE)

For several samples, concentrations of 1,2-DCE, PCE, and benzene were very high, and the analytes could not be accurately quantitated within the specified calibration range. Therefore dilutions of the sample were reanalyzed for these specific analytes. However, no supporting Form I(s) were provided for these dilutions.

The laboratory fortified blanks did not meet all of the method criteria as required. In accordance with the method, all deficiencies should be located and remedied, prior to sample analysis.

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:

Certain TCL analytes were present at high concentrations in some samples and therefore exceeded the linear range of calibration on initial analysis. For these samples, the corresponding sample dilutions are used but the Form I(s) provided do not report the correct dilution factor. The quantitation reports were used to verify the dilution factors.

PR00801-dv/hw-6/tutunov

Table A-1. Holding Time Non-Compliance Summary for the Fourth Sampling Event, October 1991, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Sample ID (Form I)	Date Sampled	Date Analyzed	Days Holding Time Exceeded for	
			Aromatic VOCs	All Other VOCs
Eglin I	10/2/91	10/5/91	0	0
Eglin II	10/2/91	10/5/91	0	0
Eglin III *	10/2/91	10/4/91	0	0
Field Blank (10/1/91)	10/1/91	10/6/91	0	0
Four Winds I*	10/2/91	10/4/91	0	0
Four Winds II *	10/2/91	10/6/91	0	0
Gassett	10/1/91	10/6/91	0	0
Gassett MS	10/1/91	10/6/91	0	0
Gassett MSD	10/1/91	10/6/91	0	0
Hartman (crusher)	10/1/91	10/6/91	0	0
Hartman (estate)	10/1/91	10/6/91	0	0

* Sample was not preserved.
 VOCs Volatile organic compounds.
 MS Matrix spike.
 MSD Matrix spike duplicate.

Table A-1. Holding Time Non-Compliance Summary for the Fourth Sampling Event, October 1991, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Sample ID (Form I)	Date Sampled	Date Analyzed	Days Holding Time Exceeded for:	
			Aromatic VOCs	All Other VOCs
Harvey	10/2/91	10/4/91	0	0
LaPlace	10/3/91	10/5/91	0	0
Matthias *	10/3/91	10/5/91	0	0
Ramsay	10/1/91	10/6/91	0	0
Smith *	10/3/91	10/5/91	0	0
Steele *	10/1/91	10/4/91	0	0
Tillett *	10/2/91	10/6/91	0	0
Tillett FR *	10/2/91	10/4/91	0	0
Trip Blank (10/1/91)	10/1/91	10/8/91	0	0
Trip Blank (10/2/91)	10/2/91	10/5/91	0	0
Trip Blank (10/3/91)	10/3/91	10/6/91	0	0
Water Blank 10/3/91)	10/3/91	10/6/91	0	0

* Sample was not preserved.
 VOCs Volatile organic compounds.
 FR Field replicate.

PR00801-DV/1191HW-6/holdtime.tbl

Table A-2. Summary of Blank Contamination and Associated Samples for the Fourth Sampling Event, October 1991, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Type of Blank	Associated Sample(s)
<u>Method Blank</u>	
VBLK01 (10/4/91)	Steele, Steele DL, Smith, Harvey, Eglin III, Four Winds I, Tillett FR
VBLK02 (10/6/91)	Hartman (estate), Hartman (crusher), Ramsay, Gassett, Field Blank, Trip Blank (10/1/91)
VBLK02 (10/5/91)	Smith DL, Matthias, LaPlace, Eglin III DL, Four Winds I DL, Harvey DL, Trip Blank (10/2/91), Eglin II, Eglin I
VBLK03 (10/6/91)	Four Winds II, Tillett, Tillett FR DL, Trip Blank (10/3/91), Water Blank
VBLK03 (10/8/91)	Trip Blank (10/1/91)RE, Field Blank (10/1/91)RE
<u>Field Blank</u>	
DI Water	Gassett
<u>Water Blank</u>	
DI Water	Field Blank (10/1/91), Gassett
<u>Trip Blank</u>	
Trip Blank (10/2/91)	Harvey, Eglin III, Eglin II, Eglin I, Four Winds I, Four Winds II, Tillett, Tillett FR
Trip Blank (10/1/91)	Hartman (estate), Hartman (crusher), Steele, Ramsay, Gassett, Field Blank (10/1/91)
Trip Blank (10/3/91)	Water Blank (10/3/91), Smith, Matthias, LaPlace

FR Field replicate.
 DI Water Deionized water.
 DL Sample dilution.
 RE Reanalyzed sample.

PR00801/HW-6/sumblank.tbl

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